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ABSTRACT

The overall aim of the Del Mod System is the improvement of science programs taught in Delaware schools; it is a working agreement among the University of Delaware, Delaware Technical and Community College, Delaware State College, State Department of Public Instruction, industry, and the schools. It was formed to bring about changes in science education in Delaware and to institutionalize those alterations so that they become an integral part of the permanent system. All of the resources of the state are woven together into a cohesive whole, with individuals in each of the participating institutions performing specific tasks. (Presented is the annual report of the Del Mod System, including financial statements, program descriptions, sample evaluation forms, and two appendixes listed Del Mod Projects.) (JB)

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1972 ANNUAL REPORT

DEL MOD SYSTEM

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EDUCATION & WELFARE
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Charlotte H. Purnell, Director
P. O. Box 192
Dover, Delaware

September 30, 1972

SP 006 818

To: Augmented Council of Presidents
National Science Foundation
DuPont Company

Re: Annual Report - Fiscal Year 1972

Gentlemen:

I am pleased to submit to you the first Annual Report of the Del Mod System.

This report describes the activities of each component within the Del Mod System and the degree of attainment of the objectives as set forth in the 1971 Del Mod proposal.

The Del Mod System has had a successful year and is making an impact on the schools of Delaware. The accomplishments discussed in this report could not have been achieved without the dedication and hard work of those individuals directly connected with the System, the cooperation of the teachers and school administration, the willingness of the institutional heads to support Del Mod's activities and the support of the DuPont Company and the National Science Foundation. This same kind of teamwork will be necessary if we are to reach our overall goal of improvement in science education in Delaware.

After reading this report, I hope you will share with us any comments or suggestions which will help us improve our services to the schools of the State of Delaware.

Sincerely,

Charlotte H Purnell

Charlotte H. Purnell
Director, Del Mod System

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DEL MOD SYSTEM
INTRODUCTION

The Del Mod System became a fully operational organization on July 1, 1971 under the aegis of the Augmented Council of Presidents. The Del Mod System is a working agreement among the University of Delaware, Delaware Technical and Community College, Delaware State College, Department of Public Instruction, industry and the schools. It was formed to bring about changes in science education in Delaware and to institutionalize those alterations so that they become an integral part of the permanent system. All of the resources of the state are woven together into a cohesive whole with individuals in each of the participating institutions performing specific tasks.

The overall aim of the Del Mod System is the improvement of the extent and quality of the science programs taught in the schools through the vehicle of the teacher so that science is an integral part of the students' basic education. The endorsement of one curriculum program over another, impingement upon the right of any district to use or adapt materials to the needs of their students, or development of a statewide curriculum is not the intent of the Del Mod System.

In order to carry out the wide range of programs and services, a variety of individuals who possess various skills are needed. The overall responsibility for the Del Mod System resides with the Augmented Council of Presidents. Members of this group are:

Dr. E. A. Trabant
President
University of Delaware
Newark, Delaware

Dr. Luna I. Mishoe
President
Delaware State College
Dover, Delaware

Mr. Paul K. Weatherly
President
Delaware Technical and Community College
Dover, Delaware

Dr. Kenneth C. Madden
State Superintendent
Department of Public Instruction
Dover, Delaware

Dr. Nisson I. Finkelstein
President and Science Advisor to the Governor
I. L. C. Industries
Wilmington, Delaware

Dr. Burt C. Pratt
Executive Secretary, Committee on Educational Aid
E. I. DuPont DeNemours Company
Wilmington, Delaware
(alternate for Dr. Finkelstein)

Mr. Paul K. Weatherly was the chairman of the group for fiscal year 1972.

The administration and coordination of the System is vested upon:

Mrs. Charlotte H. Purnell
Director
Del Mod System
P. O. Box 192
Dover, Delaware

Each of the participating institutions has a Component Coordinator whose responsibility is the administration and coordination of Del Mod sponsored programs within the respective institutions. The Coordinators are:

Dr. Robert L. Uffelman
College of Education
University of Delaware
Newark, Delaware

Mrs. Ethel L. Lantis
Dean of Development
Delaware Technical and Community College
Georgetown, Delaware

Dr. Columbus Ricks
Coordinator, UPSTEP
Delaware State College
Dover, Delaware

Mr. John F. Reiher
State Science Supervisor
Department of Public Instruction
Dover, Delaware

In addition to the administration and coordination of the System, the Director is also responsible for the activities and program of the Science Field Agents. These Agents serve a given population in a defined geographic area on the problems identified by teachers. Programs thus carried out by the Agents may be on an individual basis, entire faculty level in a particular school or district, or grade level on a multi-district basis. The Field Agents during the 1972 fiscal year are:

Miss Barbara Logan
University of Delaware
Newark, Delaware
(operational base)

Mr. James Gussett
Delaware Technical and Community College
Georgetown, Delaware
(operational base)

Miss Loretta Clark (part-time)
Wilmington School District
Wilmington, Delaware

Necessary to the operation of any system is constant on-going research and evaluation. The Director for Research and Evaluation is:

Dr. John Bolig
P. O. Box 192
Dover, Delaware

Special long-term consultants are also necessary to carry out tasks which develop as a result of feedback from the schools, findings from research data or needs defined by Component Coordinators. Consultants used this year are:

Dr. Ruth E. Cornell
Wilmington School District, retired
Wilmington, Delaware

Dr. Glen E. Schertz
Hercultes Company, retired
Wilmington, Delaware

Mr. Bruce Watt
Fort Lewis College
Durango, Colorado

Dr. Myrna Bair
Wilmington, Delaware

Each of the Components within the Del Mod System has its own distinct programs and objectives; however, all of these objectives have been carefully formulated in accordance with the broad goals and objectives of the Del Mod System.

The size and complexity of many of the problems which confront the Del Mod System require the attention of more than one Component. These problems can only be resolved by utilizing a carefully planned and coordinated team approach, involving the combined resources of the various units within each Component as well as the cooperation of other state and local agencies.

DEL MOD SYSTEM

SUMMARY OF FISCAL 1972 GRANT

Original Grant - NSF	$ 351,358.00
Original Grant - Du Pont	$ 75,100.00
Supplementary Grants - NSF	$ 41,610.00
Crystal Trust Grant -	$ 2,700.00
Supplementary Grant - Du Pont	$ 7,500.00
Total Transferred from FY 71 - Du Pont	$ 5,420.00
Total Funds Available -	$ 483,688.00
*Total Expended -	$ 341,233.83
*Total Transferred To FY 73	$ 94,835.17
Allowance for Overhead	$ 47,619.00

*Note: These totals are approximate pending payment of all outstanding expenses and final statement from the fiscal administrator of the Del Mod funds at the University of Delaware.

OFFICE OF THE DIRECTOR

DIRECTOR'S OFFICE

In the FY 72 proposal the Director's office was not viewed as a separate Component. In actual practice the Director's office carried out program activities as well as administrative responsibilities, research activities, public relations and dissemination.

The role of the Director's office has been:

1. Administration of the project
2. Coordination of all activities into a cohesive framework
3. Management of activities delegated as inherent to Field Agent operations with the creation of an interface between pedagogy and content
4. Execution of activities with the local districts which pertain to meeting a particular local need and are not part of an ongoing program in another component
5. Management of research activities
6. Public relations, dissemination of information about Del Mod, liaison with industry and professional societies.

ADMINISTRATION OF FUNDS

Funds from all sources were deposited in trust at the University of Delaware. These funds were subvented to the College of Education, University of Delaware; Delaware Technical and Community College; and Delaware State College to be administered under institutional procedures for the programs as outlined in FY 72 Del Mod Proposal. The budget for the Director's office was managed by the trust administrator of the University of Delaware, Mr. Henry Sawoska. Procedures indigenous to the University of Delaware have been followed for this budget.

The Director assumed the responsibility for the management of the budgets for the Field Agents (both NSF and DuPont funds), the research activities, local districts which are not a part of another project and the funds accruing to the Department of Public Instruction.

Each participating institution contributed a proportionate percentage of its overhead toward the management of the funds at the University of Delaware. The remaining overhead was distributed to the respective components for institutional use.

Quarterly reports have been prepared by Mr. Sawoska for the Director and Augmented Council of Presidents. These in turn are a part of the final fiscal report.

Perhaps one of the smoothest working factors of the Del Mod System has been the financial aspect. Little difficulty or problems have arisen from the outlined procedures in the 1971-72 Del Mod proposal. The only additional input needed was clarification of some fiscal and reporting procedures, particularly those involving line item changes and procurement of funds outside those mentioned in the 1971-72 Del Mod proposal. Consequently, a manual was developed by the Director for fiscal reporting and proposal submission procedures. This manual was approved by the Augmented Council and is now in use.

COORDINATION

The success of the Del Mod System and the eventual assimilation of Del Mod into existing components depend on careful coordination and planning. With absorption as the long-range goal, considerable effort has been expended to set up a mechanism for transmitting information, coordinating activities, and group planning.

The Component Coordinators have met once per month as a group. These meetings have been devoted to topics deemed pertinent by the Director or to problems as noted by the Coordinators. At these meetings, the Research Director has been present for comment and background information on evaluation.

The Field Agents have also met on a monthly basis with the Director, Component Coordinators, and Research Director. These meetings have centered largely around problems encountered by the Field Agents in performance of their roles and in providing the Coordinators with appropriate feedback.

A two-day retreat was held in early May for a recap of the year's activities and refinement of the present delivery system. As a result of this meeting, several programs were restructured to meet heretofore unrealized local needs.

Out of these coordinators' meetings have evolved an operational policy for the Science Resource Centers and a core list of materials to be included in each Center. These documents are available in the Del Mod office or in the FY 73 Del Mod Proposal.

The Coordinators also participated in information-sharing about their respective institutional activities and have asked for the advice and suggestions of other Coordinators in solving perplexing problems. Minutes are kept of the proceedings at the meetings and distributed to the Executive Committee as well as Coordinators. At these meetings it has been the responsibility of the State Science Supervisor to relate pertinent information about other Federal projects which may influence a project in a particular component.

One of the most difficult tasks undertaken by this group has been that of ordering priorities for soliciting proposals and funding projects. After many hours of discussion the conclusion was reached that, despite all of our information, the total picture was not present. Although several needs were revealed by the 1970-71 data study on teacher background, preparation, and teacher understanding of science, many other needs have been determined by good intuitive deduction and input from the grassroots level.

The Executive Committee has met monthly with the Director. This group has become a policy-making body to work out procedures to be recommended to the Augmented Council for its approval. In turn, recommendations of the Component Coordinators have been presented to the Executive Committee for action before submission to the Council. The Executive Committee has also developed into the group with whom the Director has discussed the direction of the whole system, personnel problems, ideas on which Coordinator or which institution should be approached to perform specific tasks and general advice. In turn, the Executive Committee has asked pertinent questions of the Director and developed with the Director her roles and responsibilities. Without this actively functioning group, the Director could become an autonomous entity and decisions made by the Director could conflict with institutional policies and result in a non-functioning system. Minutes are kept of these meetings.

With the role of the Executive Committee an active one, Dr. Billy E. Ross has been chosen as chairman.

PUBLIC RELATIONS, DISSEMINATION OF INFORMATION AND INDUSTRIAL SUPPORT

The 31-member Advisory Committee has met three or four times per year. Care has been taken to prevent this body from becoming a policy-making body. The original intent was that this group would serve as an evaluation group for Del Mod projects before implementation into the Del Mod package, but the wide diversity of the group, the narrowness of their respective viewpoints, plus lack of comprehension of financial, institutional, and operational constraints have made this role impractical.

Considerable discussion has taken place between Component Coordinators and the Executive Committee as to how this group should be used with the understanding that they would have a specific job without presuming on either the policy-making or operational roles.

At the present time this role has been defined as advisement and a grassroots input for district needs, dissemination of Del Mod information, and review of Del Mod projects. Several jobs have been proposed but discarded for various reasons. Nonetheless, several suggestions from this group have been incorporated into field-agent and resource-center programs.

Another strong feature of the Del Mod System is the cooperation which has existed between the National Science Foundation, industry and the schools. The Committee on Educational Aid of the DuPont Company supported the Del Mod System by a direct grant for those activities which were outside the usual jurisdiction of the funding agencies and also made available other resources to the Del Mod System. Furthermore, the Executive Secretary of the Committee on Educational Aid meets with the Augmented Council of Presidents and other representatives of DuPont and Hercules are members of the Advisory Committee.

The Crystal Trust has also made a grant to the Del Mod System for the purchase of a video-tape recorder. The one recorder already owned by the System was inadequate to serve the demands of three Field Agents and two Resource Centers. Therefore, funds were requested to meet the heavy use currently underway.

When the original Del Mod proposal was developed, the concern with dissemination and a mechanism for it were minimal; however, actual operation of the system has revealed that this was a serious oversight. The size of Delaware would seem to indicate that this concern within the state was unwarranted; yet no single agency possessed the mechanism to reach every teacher. The Advisory Committee has repeatedly noted that letters, brochures, news articles were fine but nothing replaces the face-to-face discussion. Conventional means have not imparted to our teachers and principals what Del Mod is and what it can do for them.

After careful thought, it was decided that the major key to the district would be through the middle management level in the district administrative offices. Accordingly, a dissemination meeting was held in October for curriculum directors, supervisors and Component Coordinators. The response to this meeting was gratifying with every district participating. It was discovered that no group existed for these people to share ideas and exchange information. At the meeting, each member was asked to introduce himself and talk about any science activities worthy of mention. It was rather quickly apparent that several districts were working on similar activities. As a result, some conversation and sharing is now taking place where formerly each was working in isolation. Although minutes of this meeting had not been planned, numerous requests for names of participants and the districts present led to the preparation of a list of attendees and their comments.

Since entries do exist or can be constructed for administrators, the problem still resides with the classroom teacher. Following another suggestion of the Advisory Committee, a brochure was prepared and mailed directly to every science teacher at the secondary level and every elementary teacher explaining what Del Mod is and what it can do for teachers. This was followed by a second flyer on the Science Resource Centers outlining their purpose and how teachers could use them. A third publication was circulated containing abstracts from four recent scientific and science education journals. An informational packet was also sent to each teacher describing all Del Mod programs at the local and institutional level which are available in the summer and 1972-73 academic year.

While Delaware is the target area, it has been felt of equal importance that national coverage be given to Del Mod activities. A monograph series has been started which will be distributed to interested persons throughout the United States. One paper has been accepted for publication in the September 1972 issue of The Science Teacher. The following monographs have been developed and are available:

Mrs. Charlotte Purnell - "History of Del Mod"
Dr. Robert Uffelman - "Getting Involved in Del Mod"
Dr. John Bolig - "A Philosophy for Evaluation"
Dr. Robert Uffelman - "Model for Curriculum Implementation"
Mrs. Charlotte Purnell - "Applying the Del Mod Model"

Some effort has also been given to speaking to community groups and educational associations. Once again, the demand is far greater for speakers for inservice days, American Association of University Women meetings, Parent Teacher Associations, National Science Teachers Association, out-of-state requests, etc. than can be met. Since July, requests have averaged about three per month including such groups as:

1. Delaware Academy of Science
2. American Chemistry Society
3. Parent Teacher Association
4. Delta Kappa Gamma
5. Phi Kappa Delta
6. Academic Year at University of Virginia
7. Academic Year at University of Maryland
8. American Association of University Women
9. Principals Conference at University of Virginia
10. Oregon Science and Mathematics Group
11. DuPont Committee on Educational Aid
12. American Metalurgical Society
13. Delaware Teachers of Science
14. Inservice Days
15. Chief School Officers

A feature article appeared in the Evening Journal, a Wilmington daily newspaper, on Del Mod activities emphasizing the Science Resource Centers and the Field Agents' activities. A similar article was developed in the bi-monthly publication of the Department of Public Instruction, Educationally Speaking. The Wilmington Morning News featured an editorial on Del Mod which probably produced the widest coverage.

In May a 16 mm film was made on various aspects of Del Mod. This film is scheduled for release in the fall.

Financial Summary

Office of the Director
Administration
Coordination
Dissemination

Total Amount Allocated - NSF		$39,850.00
Total Amount Allocated - Du Pont (Carried forward from FY 72)		$ 5,420.00
Total Amount Expended -		$37,639.51
Salaries and fringe benefits	29,376.87	
Travel	2,996.43	
Supplies and expense	5,266.21	
Amount Carried Over to FY 73* -		$ 7,630.49

*Includes some unpaid expenditures and fringe benefits carried over.

OFFICE OF THE DIRECTOR

Field Agent Program

The Field Agents are looked upon as the working arm of the Del Mod System and the grassroots contact with the teachers. During the past year two full-time Field Agents and one part-time Agent were employed.

Del Mod Project 71-7
Upper Elementary Project
Kent & Sussex Counties
Mr. James Gussett, Field Agent

1. Population Characteristics: The population served by Mr. Gussett consisted of 55 self-contained elementary teachers in grades 4, 5 and 6 in Kent and Sussex Counties in Southern Delaware. By the nature of the assigned population the science background of the teachers was limited and most possessed a fear of science.

2. Major Emphasis: Encouragement of upper elementary teachers who are afraid of science.

3. Operational Philosophy: In attempting to stimulate interest and familiarity with the content and processes of science, Mr. Gussett adopted as a philosophical basis for operation that it is necessary to develop a definition of science that is expressive of an attitude easily fostered, maintained and generative of enthusiasm. This is also interpreted to imply "instant success" in the classroom with any activities attempted for those persons unfamiliar with the processes of science.

Of equal cogency in an operational philosophy is that portion which must deal with the administrative services and functions of the individual districts. School districts are different and each has its individual idiosyncracies. At no time should the Field Agent attempt to dilute the autonomy of the district but rather operate under the premise that the Field Agent represents a service. The desires of teachers and administrators are basic in instituting any change in program and should be built upon rather than circumvented. Therefore, the Field Agent does not sell any specific commercial product but works within the tolerance of teachers and administrators. Personal contact, classroom work with the teacher and constant feedback are the bases for any change.

4. Time Per Participant: 2 hours per week.

5. Activities: Activities carried out by the Field Agents were based upon mutually agreed needs and geared to utilization of already published materials. Workshops, with the exception of those days where a substitute or field trip were involved, were

organized so that the Agent worked with no more than fourteen teachers at one time. In addition, in-the-classroom assistance was rendered when requested. Emphasis focused on the use of inquiry-centered techniques.

The schedule was organized in such a fashion to minimize the amount of time the teacher would be removed from the classroom. This was done by arranging for after-school sessions, use of the local in-service days, or time-off during the school day which would not affect children. Arrangements were made with each building principal and district office in order to arrive at the best time pattern. Once the time pattern was decided upon the following schedule was carried out.

Oct. 1-15	Principal and teacher visits	
Oct. 18-21	First session:	Schedule Information Sheet Field Trip Title III What is Science? Use of Resource Center Behavioral Objectives Film: A-7 Experimenting T.V. (Microteach) How Children Learn Science Time Test
Oct. 25-28	Visits	
Nov. 1-4	Second session:	IME Measurement ESS Gases & Airs Pop Bottle How to discuss Materials available in school Tips on classroom discipline
Nov. 8-11	Visits	
Nov. 15-18	Third session:	IME Thermometry IPS Quantity of Matter Film: A-18
Nov. 29 - Dec. 3	Visits Resource Center & Office	
Dec. 8	Fourth session:	The Art of the Demonstration Demonstrations that work Large group one-half day substitutes held at Milford
Dec. 13-16	Visits	

Jan. 10-13	Fifth session:	ESS batteries and bulbs Power supply SAPA Level A, Part A
Jan. 17-20	Visits	
Jan. 24-27	Sixth session:	Resource Center visits
Jan. 31 - Feb. 3	Visits	
Feb. 7	Seventh session:	Delaware State Astronomy & Environment Large group inservice
Feb. 14-17	Visits	
Feb. 28 - Mar. 2	Visits	
March 6-9	Eighth session:	Title III The Sea Beside Us
March 13-16	Visits	
March 20-23	Ninth session:	Title III The Sea Beside Us
March 27-30	Visits	
April 8	Tenth session:	N.S.T.A.
April 17-20	Visits	
April 26	Eleventh session:	Large group, substitutes involved all day SCIS material Life & Physical Science fourth thru sixth levels
May 1-4	Visits	
May 10, 11	Twelfth session:	One-half day substitutes involved Archeology Archives Building, Dover Delaware

May 15-18	Visits
May 22	Movie filming Crystallization of next year's schedule

6. Assessment of Success: In addition to the subjective measure such as the enthusiasm registered by the participants and the continual participation when neither release-time nor support were forthcoming, data are also available to substantiate the success of the program.

Mr. Gussett was overwhelmed by 250 individual requests from teachers for specific information on teaching materials, nature and content of science, resources, etc. Such requests as the following were typical:

REQUEST	COMMENT
Where do I obtain plans or information on weather instruments for my class?	Plans were given to these teachers showing them how they or their students could build cheap weather instruments. The UNESCO Source Book, placemats, and some previous course work (A.C.S.) were the primary source. The teachers were pleased that children could make them.
Is there such a thing as element 104?	Element 104 has been made (several times). Repetition of the process seems to be holding up credit. A copy of a newspaper article from Berkeley was supplied this teacher with all the information right down to the nuclear reactions.
How could I make taxonomy more interesting?	In one instance the teacher was actually concerned with operational definitions. It was suggested that the E.S.S. Creature Cards and the IMB clarification materials be used. The teachers were given this material.
Where do I get the films you've shown?	When the number reached 9, I simply gave all my teachers a copy of the Science section of the State Film List with the

REQUEST	COMMENT
	(cont.) latest addendum. Somewhere along the way there is a breakdown in communication between what comes out of DPI and what gets to the teachers.
Where can I get cheap manufactured science items?	Only one of these, but was interesting to me, so I supplied all teachers with an Edmund Scientific Catalogue. For most of them this was novel.
What can I do?	This teacher had no books, no desks, no paper, no background, and the other teachers' "less academically inclined" students. She was supplied with a complete "care" package consisting of T.E.'s of several science series, a manual of science activities (not for sale yet, but rather good), and lots of verbalization and moral support from me on their use, etc. I believe, as of this writing, that she is going to resign and get married. Del Mod loses one, but love conquers all!
I'm going to do a unit on the body. What activities can I use?	A list of activities and outcomes was supplied to these teachers. Please note that they are now asking for activities. "Mr. Wizard" is a fine source for these.
Batteries are too expensive to buy, yet the children enjoy this material. Solution?	Made and tested a battery from zinc (obtained from old batteries) and copper (from old tubing) immersed in 5% H_2SO_4. Battery bulb glowed. Smaller bulb would work better. E.M.I. supplies 1-5-volt bulbs. Above plans and information was supplied teachers. Very pleased. Children are bringing in old batteries for zinc.

REQUEST	COMMENT
How can I integrate the T4C program with my science?	Suggested a survival city type of project. Teacher feels with slight modification it might work.
Need demonstrations I can do with water.	Title III - Milford. These folks already activity oriented. I'm just helping here whenever I can. UNESCO Source Book used here.
Like to do something with electricity. What?	This teacher also requested the battery information. At this point I supplied plans for a reasonable power supply (also safe) for electrolysis work, etc., and 5 simple electrical experiments from the Thomas Edison Institute.
All the book does is talk about light. We want to do something.	Suggested -- color -- ratio and shadows -- pin-hole cameras -- energy

There were also 24 inquiries from teachers and principals for improvement of teaching techniques and the preparation of behavioral objectives.

At the outset of the program Mr. Gussett actively recruited his participants. In some cases, this was largely on a voluntary basis; however, as the program progressed 42 additional teachers have asked for service for 1972-73 year either as a group or individually. These requests are written and include such items as:

1. the same program as conducted this year
2. AAAS inservice program
3. SCIS inservice program
4. local district developed program

Of those teachers who participated this year, all are desirous of further participation during 1972-73. It should also be noted that two faculties have chosen to reproduce for the entire school in toto the December 8 presentation involving demonstrations.

7. Credit: Three inservice credits were given to each participant.

8. Participants: 60 See Appendix for participants list.

Del Mod Project 71-8
Eastern New Castle County
Junior High School/Middle School Project
Miss Barbara Logan, Field Agent

1. Population Characteristics _ The population served by Miss Logan was comprised of 64 junior high school and/or middle school teachers (grades five through nine) depending on the organizational pattern of the school in which the seventh and eighth grades are housed in Eastern New Castle County and the parochial schools throughout New Castle County. All of the participants were science teachers.

2. Major Emphasis - Improvement of Teaching Strategies

3. Operational Philosophy - The Field Agent serves as a direct source of encouragement so that he is a "giver " to teachers. This "giving" is done without the teacher fearing additional demands, evaluation-bent invasions of his classroom, or a job threat. The Field Agent gives by being available for consultation, helping with individual teacher problems in the classroom, offering special programs, testing available resource material, and being interested and concerned. This rapport is essential before any new ideas or practices are introduced and accepted. Group sessions and individual contacts are necessary for the Field Agent to touch the commonalties among the teachers as well as the diversities which exist.

4. Activities - Because of the many common problems existing among teachers, fifteen group sessions were offered to each teacher. Each group consisted of about 10 or 12 teachers and met on a bi-weekly basis for 14 weeks and one large group session on a regularly scheduled State inservice day. Each teacher was provided with a substitute who was trained and supported by Del Mod in order that the teacher could attend the sessions on a released-time basis.

The activities undertaken by the teachers at the group sessions were:

A. Preparation of 2 x 2 slides and transparencies from magazine pictures
B. Preparing permanent mounts for microscope
C. Construction and use of stream table equipment
D. Activities involving animals in classroom
E. Planning Earth Day Activities
F. Collecting a bag of tricks (Rainy Day Activities)
G. Individual experiences in other curricula
    a. Earth Science Curriculum Project (ESCP)
    b. Conceptually Oriented Program for Elementary Science (COPES)
    c. Secondary School Science Project (SSSP)
    d. Quantitative Physical Science (QPS)
    e. Idea Centered Laboratory Science (I-CLS)
    f. Educational Research Council (ERC)
    g. Investigations in Science (IIS)

H. Trip to National Convention of National Science Teachers Association in New York

A second phase of the Field Agent program involved classroom observation for diagnosis of teaching strategies and consultation. Each teacher was video-taped at least once and a viewing with the Field Agent enabled the teacher to assess his teaching techniques from a different vantage point.

A third phase of the Field Agent's activities included specific instruction on the teaching of science for the individuals who served as regular substitutes for the released time of the science teachers. They were given four activity-oriented sessions with some discussion on the problems peculiar to substitute work.

A topic outline of each session follows:

Session I (September 21, 22, 23)

A. Discussion of Issues in Elementary Science
B. Introduction to a Lab Situation
C. Pre-post Laboratory Discussion Techniques
D. Effective Use of Audio-Visual Aids
E. Teacher Behaviors and Skills
F. Needs of a Substitute Teacher

Session II (November 23)

A. Round Table Discussion of Common Problems
B. A Substitute Prepares for the Day
C. Using Games in the Science Classroom

Session III (January 31)

A. Working with the Class: An Experience in Inference
B. A Closer Look at Teacher-Student Interaction
C. Handling the Discipline Problem

Session IV (May 16)

A. Putting the "Processes" Together
B. Experiences in Trust-Building
C. Evaluation of the Substitute Experience

5. Assessment of Success - Baseline Data against which the success of the program could be measured were gathered by Dr. John Bolig, Research Director of the Del Mod System. In addition to information about the teacher's background and preparation, a survey of teachers' attitudes toward science was obtained through the use of the Welch Science Process Inventory, Form D. This was used as a pre-post measure of the program and will be analyzed in relation to the other data by Dr. Bolig.

Subjective evidence of change was observed. All the teachers tried new teaching strategies with varying degrees of success. The Field Agent observed a definite effort on the part of the teachers to incorporate more activity-oriented approaches, to prepare better classroom tests and to increase student participation.

In cases where supply requisitions were made available to us, a change in ordering patterns was noted. For example, the science department at the Dunleith Community School purchased ESS materials which could be used on either fifth or sixth grade level. These were the first monies available to this department for several years. It may be interpreted as the administration's approval of Del Mod's work with these teachers.

In the junior high in the same district one teacher ordered alcohol burners, which before the program he felt were too dangerous to use in the classroom. The other teacher ordered a supply of lumber from which he hopes to build stream tables and gnomon boards for next year.

At Krebs Junior High the earth science teacher requested refinishing materials. He hopes to reclaim some flat top table desks for use in his classroom.

The George Read Middle School adopted the IMB program for their seventh grade and used their library allotment for science games and flexible ESS materials such as Attribute Games, Mirror Cards, Tangrams, etc.

A universal comment in participant evaluations made reference to the benefit of the exchange among teachers that took place during the group sessions. Hearing that others had problems similar to their own, helping to find solutions and exchanging ideas that worked, provided the kind of support that drives out fear. It seems that this camaraderie is one of the strong points of the program.

Perhaps the most obvious and least measurable change observed was one of growing enthusiasm. This enthusiasm was observed in classrooms where teachers and students began enjoying the purposeful activities attempted. Teacher centered classrooms began to be transformed to student centered, lab oriented workshops. In addition these same teachers have become Del Mod salesmen encouraging colleagues to take advantage of the services offered.

6. Credit - Each participant received six hours inservice credit. In addition, eight participants enrolled in a graduate course in special problems and applied their Field Agent experience toward in-depth study of a specific problem.

7. Participants - 60 See Appendix for participants.

Del Mod Project 71-5
Wilmington
Middle School Science Teacher Project
Miss Loretto Clark

The problems of the City of Wilmington represent those found in any urban complex and require consultants who have had not only experience in the inner city but also compassion in dealing with the problems of teachers and students. Activities of another 15-18 teachers would have created such a burden on Miss Logan that her efforts would not have been as effective. Accordingly, Miss Loretto Clark was employed as a one-day-per-week consultant to work with the teachers in their classrooms.

1. Population Characteristics - The group served by Miss Clark was comprised of 18 middle school science teachers in the four middle schools of Wilmington.

2. Major Emphasis - Improvement of teaching strategies and exploration of materials available for adaptation to the development of an inner-city middle school program.

3. Operational Philosophy - A Field Agent involved in an inner-city project at the middle school level should encourage teachers to realistically appraise their students' ability levels and design activities accordingly. The program should be one of helpful analysis as opposed to criticism on what teachers are presenting. Everything must be directed to reality rather than idealism as to what has been or what is possible in another locality.

4. Time Per Participant - 1 full day per month plus 2 hours per month.

5. Activities - Each teacher was visited once per month in his classroom for personal assistance. Joint meetings were held with each faculty after school on the same day on which the classroom visit took place. One Saturday per month the group of 18 teachers met together for various activities.

The topics presented at the group sessions were:

October:
1. General meeting for orientation
2. Implementation of a science program in the inner city
3. Activities from S-APA which involve communication, classification and observation

November:
1. Level I ISCS activities
2. Recap of school visits

December:
1. Level II ISCS activities
2. Recap of inner-city problems

January:
1. Level III ISCS activities
2. Distribution of tape recorders for audio record of a lesson for analysis by Flanders Method

February:
1. Discussion of tapes and how they can be used
2. Introduction to purpose of behavioral objectives and construction of simple objective
3. Use of simulation games

February 7, 1972: Attendance at state-wide inservice day presented by Miss Logan and Mr. Gussett

March:
1. Working with ESS units
2. Writing assessment tasks
3. Use of attribute games and problems
4. Review of professional organizations of interest to teachers
5. Display of science publications

April:
1. IPS activities
2. Discuss activities
3. Use of audio-visual materials in classroom

April 8, 1972: Trip to NSTA consolidation in New York City

May:
1. Rap session on "Where do we go from here?"
2. Plans for what is to be accomplished during summer program

It should be noted that the entire focus of this program was exploratory in nature and not intended as an in-depth study for implementation of a particular program. The intent was also to develop some plans for concentrated work in the summer.

6. Credit - Each participant was given 3 inservice credits.

7. Assessment of Success - When the agent began classroom visits in October an open hostility was noted. As the year progressed, this hostility lessened and teachers began to ask for help. The number of activity-oriented lessons was noticeably increased with many activities presented during the Saturday sessions incorporated into these lessons.

The teachers asked the district to present a workshop on the use and production of audio-visual materials as a means of reaching the nonverbal child. This will be active during the fall.

The teachers have also entered into discussions with their principals to order materials for an activity-oriented program. In several cases, these discussions became somewhat heated.

Perhaps the best criterion is the development of a cogent plan of summer work with all teachers willingly involved therein.

8. Comment - The experience with a part-time nonresident Field Agent filled a needed gap for the Wilmington teachers. The original purpose of stimulation of interest was accomplished; however, the suggestion from the principals and teachers was strongly for discontinuation of the one-day-a-week consultant practice in favor of a part-time resident person who intimately knew the problems of the district and was available for call at any time.

9. Participants - 15 - See Appendix for list.

Financial Report

Office of The Director

Field Agent Program

Total Amount Allocated by NSF -		$ 42,850.00
Total Amount Allocated by Du Pont -		$ 32,500.00
Total Amount Allocated by Crystal Trust - (for video tape recorder and tapes)		$ 2,700.00
		$ 78,050.00
Total Amount Expended		$ 71,870.00
Salaries and benefits (2 full- and one part-time agent, 2 half-time secretaries and misc. payroll)	33,826.80	
Travel	3,667.99	
Substitutes	23,160.00	
Supplies and expense (includes consultants and teacher stipends)	11,215.21	
Amount Carried Over to FY 73* -		$ 6,180.00
Cost Per Participant -		$ 532.00

*Includes some unpaid expenditures and fringe benefits carried over.

OFFICE OF THE DIRECTOR

Local District Programs

At the outset of the Del Mod project it was determined by the Advisory Committee and the Component Coordinators that every district should participate in a Del Mod activity which could clearly be discerned as indigenous to a district. Field Agent programs accomplished part of the task but did not reach every district; likewise, the programs of the institutions of higher education were oriented more toward specific disciplines and did not bring about the total-service concept desired by Del Mod. Six districts not being served in other ways were asked to identify their pressing needs in science education. The needs were arrived at by a group decision of the teachers and administrators.

This relationship has provided entree to these districts and gained the impact needed to develop further the Field Agent programs and resource centers.

Del Mod Project 71-4

Newark School District

1. Project Name - Auto-Tutorial Project
2. Project Director - Catherine Y. Bonney
3. Component Assignment - Office of the Director
4. District Involved - Newark
5. Participants - 12 - See Appendix for list.
6. Total Student Population Affected - 500
7. Objectives - To prepare a library of auto-tutorial materials for use in science instruction.
8. Target Population - Grades 7-12
9. Time Per Participant - 10 full days plus 2 hours per week.
10. Activities -

Summer - August 2-12, 1971

The teachers met at the administration building to prepare auto-tutorial units on topics they deemed germane to their area for use in remedial, enrichment, or individualized instruction. The products of the workshops are:

CODE	TITLE	LEVEL	DEVELOPERS
A-T 1-68*	Sound: What Causes it? What Is It?	I	C. Y. Bonney
A-T 2-68*	Sound: Is It Noise or Music? What Determines Pitch of Music?	I	C. Y. Bonney
A-T 3-71	Measuring Populations Part I	H	H. Dillner
A-T 4-71	Measuring Populations Part II	H	H. Dillner

*Written in 1968; refined 1971

A-T 5-71	Light Microscopy: Basic Technique (Introduction to B & L 225)	H	W. Johnstone
A-T 6-71	Monohybrid Cross	H	P. Henderson
A-T 7-71	Mitosis	H	P. Henderson
A-T 8-71	Meiosis	H	P. Henderson
A-T 9-71	Using the Protractor	M	G. Cressman
A-T 10-71	Blood Typing Technique	H	W. Johnstone
A-T 11-71	Metric System: Introduction	M,H	Diane Sisk
A-T 12-71	Observation (CHEM Study)	H	W. Sokol
A-T 13-71	An Imaginary Trip Through the Marsh	M	N. Sullivan
A-T 14-71	What are Some Effects of Ecology	M	K. Darlington
A-T 15-71	Salinity, Density, Densiclines, and Density Currents	M	S. Allen
A-T 16-71	The Wherefores and Whys of Density Currents	H	S. Allen
A-T 17-71	Aseptic Technique	H	P. Harding
A-T 18-71	Photosynthesis	H	P. Harding

LEVELS: I - Intermediate; M - Middle, H - High School

Academic Year - October 1971-May 1972

A. Duplication of completed A-T's - The majority of completed A-T's have been duplicated for placement in the four Science Resource Centers. All producers have been advised of any missing components, and it is expected that these matters will be corrected promptly. Because of the expense involved it was deemed inadvisable to duplicate the A-T systems which contained film loops or super-eight films.

B. Cataloging of completed A-T's - Each A-T system has been cataloged according to the Dewey decimal system (see attached). A copy of this catalog will be sent to each Resource Center and to each library in the Newark School District.

C. Dinner workshops - Even though there was no provision for formal A-T production during 1971-72, five dinner workshops were held enabling A-T producers to continue developing systems. Dates of these dinner meetings were October 11, November 8, January 10, March 13, and May 8.

Teachers engaged in this activity met after school in the administration building and worked two or more hours. They then went to dinner at the Howard Johnson's Motor Lodge, returning after dinner to continue working until 9 p.m. These meetings helped maintain the interest of veteran producers and also provided an opportunity to introduce the A-T technique to new recruits. At one of the dinner workshops two teachers from the New Castle-Gunning Bedford District joined the Newark staff.

The secretaries and co-ops who helped with the clerical work attended at least one workshop. Included in this group were: L. Jackson, M. Hazen, N. Sanborn, and J. Haley.

D. NSTA Convention - On April 8, 1972, nine members of the Newark staff accompanied other science teachers from the state on a bus trip to the NSTA Convention in New York City. Those in attendance included:

P. Henderson
V. Wood
O. Shultz
S. Allen
R. Chambers
H. Dillner
E. Davis
C. Bonney
J. Strum

E. Auto-Tutorial Tape-Slide Presentation - At the January 18th meeting of the Newark Board of Education Mrs. Catharine Y. Bonney presented a 20-minute tape-slide program on the techniques of producing and using the Auto-Tutorial system. Mrs. Bonney prepared the script and Mr. Philip Toman produced the majority of slides for this presentation.

This same presentation was also given to the P.T.A. Council and to a few individuals who later visited the offices of instruction.

F. Del Mod Movie - On May 24th scenes of A-T systems in use at Newark High School were shot for purpose of being included in the Del Mod movie production.

11. Assessment of Success -

Summer - Teachers - In addition to the subjective comments on individual evaluation sheets, the following summation was compiled:

	POOR	FAIR	GOOD	EXCELLENT
1. Room accommodations were			60%	40%
2. Supportive services were		20%	40%	40%
3. Starting time was			60%	40%
4. Length of working day was			80%	20%
5. Evaluation session was was			60%	40%
6. A-T approach to individualizing instruction is				100%
7. Possibility of my using my A-T(s) is/are				100%
8. Possibility of my producing more A-T's is				100%

Summer - Students - Ten students assisted in evaluating the prepared A-T's. Mechanical difficulty with some of the recorders accounted for some of the poor ratings. In addition, a few of the planned visuals were incomplete at the time of the evaluations.

Grade Distribution of Student Evaluators (as of September 1971) -

Grade Eleven - 3
Grade Nine - 4
Grade Eight - 1
Grade Seven - 2

Total - 10

A-T Evaluation -

	DOES NOT APPLY	POOR	FAIR	GOOD	EXCELLENT
Objectives Clearly Defined				33%	67%
Instructions Clearly Made			3%	21%	76%
Tape					
Voice		3%	6%	39%	52%
Pronunciation			9%	30%	61%
Clarity		4%	10%	46%	40%
Coherence			10%	50%	40%
Other Aids					
Models			12%	24%	64%
Charts			9%	33%	58%
Hand-outs			15%	35%	50%
Other		15%			85%
Overall Evaluation			4%	54%	42%

Other subjective comments were compiled concerning the strong points and weaks points of the program as well as individual tapes.

Financial Summary

Newark School District

Summer -

Total Amount Allocated by Del Mod	$1,600.00
Total Amount Allocated by Newark District	1,435.95
Total	$3,035.95

Amount Expended

20 cassettes	$ 26.75	
20 substitute days	405.00	
11 participants		
Audio-visual (1) 1 week	100.00	
Developers (9) 2 weeks	1,800.00	
Director (1) 2 weeks	250.00	
Film processing, laminating, etc.	45.73	
Supplies, misc.	12.47	
Indirect costs (15%) based on district's operating budget	396.00	
Total		$3,035.95

Academic Year -

Total Amount Allocated by Del Mod	$1,000.00

Amount Expended

Teachers' Visual Aid Center	$ 250.00	
Cassette Tapes	260.00	
Secretarial Supplies	49.95	
Dinner Expenses	230.00	
Secretarial	210.05	
Total		$1,000.00

Cost Per Participant	$ 335.00

Del Mod Project 71-14

Alexis I. DuPont School District

1. Project Name - Environmental Education

2. Project Director - Thomas Hounsell

3. Component Assignment - Office of the Director

4. District Involved - Alexis I. DuPont

5. Participants - 43 - See Appendix for list.

6. Total Student Population Affected - 1260

7. Objectives

   A. The infusion of population-environment concepts into the district curriculum

   B. The modification of the emphasis in the curriculum to encourage individual responsibility

   C. The utilization of the immediately surrounding school property for environmental study

   D. The full utilization of the community resources

8. Target Population - K-4

9. Time Per Participant - 10 full days plus 2 hours per week

10. Activities -

    Work was concentrated in kindergarten and grades one, two, three, four, and seven. Primary efforts were directed toward teacher education and the infusion of population environment related concepts and materials into the existing school program. Through inservice work with teachers an activity-oriented, controlled-access system in the area of man and his environment as related to mathematics, science and social studies has been designed. This system was in use in the elementary schools this year. One of the major tasks of any endeavor of this type is the creation of activities and materials usable by children with a wide range of abilities.

    During the first workshop (summer of 1971) the decision was made to concentrate on the creation of activities which would be usable primarily with the upper level elementary child. Accordingly, approximately 750 activities were written in the area of math, science and social studies. In an effort to make the program more usable to students working on an independent basis, self guiding worksheets were included. The worksheets along with the necessary equipment were stored in a central location in each building. In each case a specific person was designated to dispense the material at the teachers' requests. The librarians were also equipped to fill requests from teachers for resource materials related to the specific topics being studied. Since both of these services can be completed without the teacher leaving her classroom, the system enables the teacher to run a truly individualized program for each of her students.

The present system was implemented using a rather unique released-time program for teachers. Del Mod provided funds for substitutes to take the place of teachers in the classroom thereby releasing them for specialized training sessions. However, instead of employing a substitute, a subject matter specialist in the area of astronomy and planetarium science was hired. This not only released the teacher from her classroom, but also provided us with another educational program for the students. This year the planetarium program was completed K-8. In addition the astronomy teacher prepared a conceptual guide to our program K-7. This guide is being printed and will be issued shortly. The actual astronomy program followed this form:

A. Teacher training session in the planetarium
B. Specialist arrives and takes over the class
C. Pre-session in the classroom
D. Trip to one of the district's planetariums
E. Post-session review
F. Summary session with teacher
G. Follow-up activities and projects
H. Monthly celestial bulletin

Judging by the reactions of the students, teachers and parents who took part in the planetarium program, it was an unquestionable success.

In addition to the basic program a number of enrichment activities were started this year. Each of the elementary schools had a marine aquarium set up and operating throughout the school year. This aquarium was available to all of the classes within the building. Each of the teachers underwent an intensive inservice program in marine biology after which nine of them proceeded with the study by taking their classes to Tower Road Beach, Slaughter Beach and Cape Henlopen State Park. This part of the project was carried out in conjunction with Dr. Geens' Sea Beside Us Project in Milford. Nearly fifty parents were involved in the actual trip. With the exception of kindergarten, all levels first through fourth participated. The experience was an unqualified success with the teachers, parents and children alike. Two of our teachers continued their study of marine science by participating in a detailed dissemination seminar given by Dr. Geens during a weekend encampment at Cape Henlopen State Park.

A tremendous amount of the project director's time this year was involved with the ordering and disseminating of equipment and the setting of central facilities for storage in each building. This task is now essentially complete which means that the responsibility for the equipment should now shift to the building principal.

11. Assessment of Success -

In an effort to evaluate the program this year a very brief questionnaire was issued. The results were as follows:

Total issued (K-4) - 42
Total returned - 21
Response - 50%

100% of the people responding indicated that they made use of the central storage system.

23% of the people responding indicated that they had not used the card system.

4% of the people responding indicated that they used the card system in its entirety.

71% of the people responding indicated that they used the card system in some form.

The people responding to this questionnaire made many useful suggestions for the revision of the system.

Two articles have been written on the project, one in the Delaware Educational Research and Development Council newsletter "Currents" and in the Connecticut Elementary Newsletter. In addition the project is to be presented nationally in the journal "Nation's Schools." This article is due to appear during this summer or fall. Materials are also registered and disseminated through the ERIC Information Analysis Center for Science and Mathematics Education.

Financial Summary

Alexis I. DuPont School District

Total Amount Allocated by Del Mod	$ 1,500.00
Total Amount Allocated by -	
Mellon Foundation	$15,000.00
NDEA Title III	4,000.00
Local Support	5,000.00
Total Allocated	$25,500.00
Amount Expended -	
Salaries (full time)	$15,000.00
Release time	1,500.00
Materials and expenses	9,000.00
Total Expended	$25,500.00
Cost Per Participant	$ 593.00

Del Mod Project 71-12

St. Mark's High School

1. Project Name - Focus Program (Focus on Curriculum for Underachieving Student)

2. Project Director - James T. Delaney, Principal

   Other Staff - Alfred Di Emedio, Science Teacher
   Sr. Nancy Crossen - Math Teacher

3. Component Assignment - Office of the Director

4. District Involved - St. Mark's High School

5. Participants -

6. Total Population Affected - 20 students

7. Objectives

   A. To raise the academic level and to provide an impetus to learning for the educationally, culturally, and motivationally deprived students entering the ninth grade.

   B. To create an environmental setting for the specialized education for the slow learning or underachieving student.

   C. To raise the academic maturity level of the student to the point where he is able to function successfully within the ordinary structure of the school.

   D. To develop attitudes of social compatibility through a variety of cultural and academic interaction.

   E. To develop within the student an appreciation for man's ingenuity and creativity.

   F. To channel formerly undirected energies into responsible action.

8. Target Population - Ninth Grade

9. Time Per Participant - 2 hours per week average

10. Activities

    A team of 15 teachers was formed to coordinate the program and to work with students as the core teachers. (The team was composed of teachers from the mathematics, science, and social studies departments.) Teachers in other departments will be drawn into the program at the appropriate time.

Students were formed in a school-within-a-school with their own location in the building and followed a time schedule most appropriate to their learning ability.

Teacher sessions were held in late afternoon and early evening for planning and development of activities for the program as follows:

September 7
September 15
October 19
November 30
December 16
January 18
February 24
March 24
April - no meeting
May 16

Phase I - To plan and develop the course of action for the program which would provide for:

- sufficient time to learn with ease and thoroughness
- small class to enable them to have the benefit of special attention
- flexible structure
- variety of teacher personalities to give adult identification
- opportunities to make decisions within the realm of their capacities
- extensive field trip program to give exposure to community
- incorporation of a variety of alternate means to strengthen the learning process
- subject matter of high interest geared to their abilities

Phase II - The use of a multidiscipline approach for Focus Child, through the science and math program but also using the art, dramatics, music and communication skills.

Phase III - Continued orientation and field trips for teachers.

Phase IV - Communication to parents - Sessions held October 19 and May 14.

Phase V - Communication to educators - A presentation on program was made at National Catholic Educators Association Meeting in Philadelphia, April 4, 5, 6, 1972 by Sister Nancy.

11. Assessment of Success

A. Science Program -

All signs indicate that the science portion of the Focus Program has been successful with most of the students involved.

While the course objectives are very important, the idea of "socialization" has had the most profound effects. The attitudes of many of the individuals within the program have improved considerably.

Within the program objectives many of the activities have been accomplished by the majority. The need for observation as the basic tool in logical problem solving and as the basis of the learning process; measurement, linear, liquid, and mass; and experimentation with the physical changes in matter as well as the characteristic properties of substances and their subsequent use on the separation of various phases of matter have all been explained.

While some of the above material has not been retained by the individuals (never was it expected to be), it does seem to be appreciated at its presentation and for some time thereafter.

B. Mathematics Program -

The Focus Program has succeeded in arousing interest in math by providing a sufficient number of successful experiences. A variety of topics employing manipulative devices and visual aids were initiated to reinforce the lacking basic skills. An individualized approach was used to permit acceleration and special help where needed. After four months into the program noticeable groupings developed naturally as follows:

3 students - moved ahead; needed only little teacher help
2 students - moved ahead; needed teacher direction, some help

5 students - progressed spasmodically; needed teacher help and push (These students lack ability to stick to or complete the job unless constantly prodded)
2 students - stagnated
3 students - moved ahead very slowly, handicapped by need of much reinforcement of basic skills

All students made progress. One student seemed to fail most rapidly after a prolonged period of absence. Further observation of his problem is needed before analyzing the case. Another had so set up a defensive attitude that no approach seemed to overcome it. There was no self-assurance and dependency upon copying was deemed the only way out. To remedy this problem, time on the adding machine and group, rather than individual, work was begun.

Both student and teacher evaluation were undertaken. The results of the student questionnaire were divided about 75% to 25% on like-dislike of the program and helped-not helped by program.

Teacher evaluation showed that 15 of the students appeared to have achieved sufficient "sociability" that they could enter the regular 10th grade science, mathematics and social studies programs of the school. Three were recommended to be retained in the program for another year and two left school.

Financial Summary

St. Mark's High School

Total Amount Allocated by Del Mod	$ 1,000.00
Total Amount Allocated by St. Mark's	800.00
Total	$ 1,800.00
Amount Expended -	
Dinner Working Sessions	$ 600.00
Release time	300.00
Materials	100.00
Total	$ 1,000.00
Cost Per Participant	$ 50.00

Del Mod Project 71-13

Stanton School District

1. Project Name - Model for Articulation
2. Project Director - John H. Jenny
3. Component Assignment - Office of the Director
4. District Involved - Stanton
5. Participants - 12 - See Appendix for list.
6. Total Student Population Affected - 1500
7. Objectives

   A. In a recently consolidated district to bring about coordination in the science program between the junior high schools

   B. To articulate the junior high school science program with the elementary and high schools
8. Target Population - Grades 7-9
9. Time Per Participant - 1 hour per week average plus 4 full days
10. Activities

The curriculum director appointed a chairman of the district-wide science committee which was vacated by a high school teacher of engineering concepts and physics. In recognizing that the first hurdle was that of the integration or articulation of SAPA program in the elementary school and the two junior high schools, it was decided to have co-chairmen. The assistant superintendent appointed Mrs. Susan Bady, a junior high school teacher of seventh grade science, and Mr. Irv Eberhart, an elementary science teacher, in a team situation. This proved to be a very fortunate move.

The first step was to orient a special committee of the total science committee as to the problem as seen from a district level. It was pointed out that the SAPA program was not always completed by the end of the sixth grade and that the seventh graders had entirely different programs in each of the two junior high schools. The next step seemed to be the discussion of the problems with the staff of the elementary and the junior high schools.

This was done with released time for the teachers. It was well planned with plenty of lead time. Adequate science substitutes were employed for the day. The results were extremely discouraging. It looked as if the problem would never be solved. Neither junior high school wished to have anything to do with the SAPA program and some of the elementary teachers wished to bolt the program. Neither junior high school wished to give up its particular program. (One taught "Man and the Biosphere" in the seventh and the other taught "Time, Space and Matter" in the eighth. The only common element in the instruction was the general science taught as an elective in the ninth grade. Only a sampling of students took this. It was most discouraging and disheartening to the director of instruction who felt like throwing in the sponge.

The second step had been planned prior to the discouraging first meeting so it was next implemented. The teachers were released to do some inter-visitation between levels and between schools of the same level. In this inter-visitation, the teachers began to see the problems of articulation and upon return to their own schools and the next committee meetings had different attitudes toward the district-wide problems. No solution was imminent as yet. Several visitations occurred as well as out-of-district field trips before it was decided to compromise on the issues.

The group next included the junior high school principals (since it was in their division that the major changes would take place). In a fine "give and take" discussion, it was suggested that one junior high drop its seventh grade program and adopt "Time, Space, and Matter." This move would then give common programs in both schools.

There still remains the problems of smooth articulation from SAPA to the junior highs and the need for some more comprehensive program for the ninth grade. It has been suggested that biology (which historically was in the ninth grade) be placed there and that with the sequencing of chemistry and physics, the twelfth grade would be free for advanced electives.

11. Assessment of Success

One of the big problems now was financing since neither principal had planned for such a move in curriculum. The assistant superintendent for curriculum was able to "scrounge" from several sources and provided $2,000 for the one school to implement the "Time, Space, and Matter" program and $3,000 to the other school to implement the "Man in the Biosphere." The difference in monies was needed because of the need for additional microscopes in the one school. In working with the principals the assistant superintendent was able to get a commitment from each that from their next budget (July 1972) they would fully implement both programs.

Financial Summary

Stanton School District

Total Amount Allocated by Del Mod	$ 1,500.00
Total Amount Allocated by -	
Stanton District (for student materials)	5,000.00
Total	$ 6,500.00
Amount Expended -	
Release Time for Teachers	$ 1,500.00
Materials for Students	5,000.00
Total	$ 6,500.00
Total Cost Per Participant	$ 542.00

Del Mod Project 71-19

Marshallton-McKean School District

1. Project Name - Physical Science for Primary Teachers

2. Project Director - Winston Cleland

   Other Staff - John Reiher

3. Component Assignment - Office of the Director and
   Department of Public Instruction

4. District Involved - Marshallton-McKean

5. Participants - 17 - See Appendix for list.

6. Objectives

   A. To provide instruction in basic concepts of physical science which will establish enough content background for implementation of AAAS science.

   B. To follow up interest-stimulator primary math science workshop conducted by Department of Public Instruction.

7. Total Student Population Affected - 525

8. Target Population - K-3

9. Time Per Participant - 5 full days

10. Activities

    The project director, Mr. Winston Cleland, produced three modules for the basic concepts inherent to (1) Newtonian mechanics, (2) electrical circuits, and (3) heat, temperature and change which would provide sufficient background for comfortableness with physical science concept in AAAS.

    During the third week of June 1972 the modules were tried out with the teachers in a laboratory setting. Pre- and post-tests were administered for each module.

11. Assessment of Success

    The workshop was evaluated using three sources: informal teacher-comments, instructors' comments, and pre- versus post-test scores.

Teacher-comments were all favorable. They said it was "profitable," "well organized" and in general an enjoyable learning experience. They felt the side benefits of working with people from other buildings were stimulating. They felt, in fact, that another week of work was needed on improving their backgrounds in science. One comment received was: "You can tell we liked the week because we didn't want to leave the day they closed the building early because of flooding."

The teachers suggested that the AAAS teacher-booklets could have been provided. They felt that these materials could have helped give them insight to the activities.

One comment was that if we had more time it would be helpful if the AAAS kits be left for teacher perusal and time provided for rummaging and asking questions about the materials.

The instructors' feelings were that the workshop went well, the teachers were very enthusiastic learners and increased their knowledge of and confidence in their ability to teach the physical science concepts in AAAS.

The pre- and post-tests demonstrated an undeniable increase in subject matter competence due to the instruction. It can be argued that there was not enough time lag to reliably check the effect the instruction had on their knowledge of the subject matter; however, there was enough change in scores to warrant the statement.

In the mechanics unit (Unit I), one-half of the people doubled their scores. The electricity unit score changes were just as conclusive. The mechanics pre-test showed an average 41% competence while the post-test demonstrated an average 75% competence. Electricity scores rose from a pre-test average of 50% to a post-test average of 79%.

An item analysis shows some weakness in the questions (test item 6 for Unit II and item 15 in the mechanics Unit I test). Test item 15 Unit I was deemed to lack content validity and was dropped from the scoring.

Comment - Based on the above statements and the material presented, the Del Mod staff has decided to publish the modules for use of Field Agents, other curriculum leaders, and the Science Resource Centers. The modules are not included with this report since they are somewhat lengthy.

Financial Summary

Marshallton-McKean School District

Total Amount Allocated by Del Mod	$ 1,000.00
Total Amount Allocated by District	500.00
Total	$ 1,500.00
Amount Expended -	
Teacher Support	$ 800.00
Instructor's Salary	200.00
Materials	500.00
Total	$ 1,500.00
Cost Per Participant	$ 88.00

Del Mod Project 71-10

Alfred I. DuPont School District

1. Project Name - Evening Laboratory Program

2. Project Director - Wilfred Miller

3. Component Assignment - Office of the Director

4. District Involved - Alfred I. DuPont

5. Participants - 3 - See Appendix for list.

6. Total Population Affected - 20 students

7. Objectives

   A. To develop means of accommodating the students who are desirous of pursuing science activities over and above those available in regular programs.

8. Target Population - Grades 10-12

9. Time Per Participant - 3 hours per week

10. Activities

The Evening Laboratory Program got started in early October and ended in early May. An announcement to the student bodies of the two senior high schools in the district was distributed in October. The response was not as large as had been anticipated. The announcement in regard to writing proposals may have been more forbidding than was intended. The total of students who served was 17-20 at all times. One school modified its meeting time to daily meetings after school to accommodate the needs of the students and the nature of their projects. The other school met regularly on Monday evenings.

Both instructors found it necessary to help students find and define a problem within the student's area of interest. Following is a list of the problems or areas investigated:

A. Tissue culture
B. Textile dyeing
C. Simple harmonic motion - calculus derived model
D. Ampere's Current balance

E. Photomicrography
F. Westphal balance
G. Spectrophotometry - dyes and mixtures
H. Biers law
I. Astronomy
J. Tube and transistor characteristic curves
K. Analog computer simulation of harmonic and projectile motion
L. Kirchhoffs laws
M. Analysis of air for pollutants
N. Hydroponics
O. Rabbit antibodies
P. Effect of fresh water on crabs
Q. Heredity - fruit flies
R. Silk screening components for computers

These problems were defined and the means of investigation recorded. The instructors further refined this student developed material with the intention of providing other classroom teachers with a bank of activities suitable for student investigations. It is hoped that this activity will maximize students' use of in-school time and the project room facilities which are available.

11. Assessment of Success

The research proposed by the students was completed and a scheme developed to provide the science-oriented student with ideas he can pursue in the context of the regular school program.

It is felt that the number of students involved would be greater if time is available during the day rather than after school or evenings.

Financial Summary

Alfred I. DuPont School District

Total Amount Allocated by Del Mod	$ 1,500.00
Amount Expended	
Salaries	900.00
Materials	600.00
Total	$ 1,500.00

Cost Per Participant - Not appropriate due to nature of project since two teachers were included as co-developers

Individual Teacher Program

One of the areas for which the 1971-72 Del Mod proposal did not provide was any opportunity for an individual teacher to propose and develop an idea which would be of direct benefit to his classroom situation. After discussion by the Advisory Committee, key curriculum leaders and teachers, it was decided that small amounts of funds would provide teachers the incentive as well as that extra money for supplies, computer time, individual time and materials.

Since no funding had been provided a little residue money from private sources from FY '71 was set aside as a pilot. Because funds were so limited the program was not widely publicized but rather several districts were asked to suggest teachers who might be contacted.

Four requests were received. Two were deferred and two teachers, Mr. Dale Reynard and Mr. Winston Cleland, were selected to develop their ideas.

Mr. Reynard's idea (Del Mod Project 71-20) resulted in the development of computer programs for student-derived data in CHEMS. The laboratory experiments are actual labs in CHEMS. Nine programs were produced as follows:

Program 1 - Masses of Equal Volumes of Gases
Program 2 - Copper-Silver Nitrate Reaction
Program 3 - Conversion of Mass
Program 4 - Formula of a Hydrate
Program 5 - Reaction of Mg with HCL
Program 6 - Energy of Combustion and Phase Change
Program 7 - Chemical Equilibrium
Program 8 - Acid-Base Titration
Program 9 - Moles of Cu, Moles of Ag and Moles of Electrons During Electrolysis

These programs are stored in the Project Delta library and available for all teachers who have access to the Project Delta computer.

Mr. Cleland's project (Del Mod Project 71-21) was the development of modules for instruction of elementary teachers in the concepts of physical science. These modules consisted of activities, resources, and tests for each of the modules. The use of these modules has been previously described in the Marshallton-McKean project. They were field tested and are ready to be distributed.

Research Director

The 1971-1972 activities of the Director of Research and Evaluation will be reported for five major areas of Del Mod activity:

1. Videotaping and video-analysis of Delaware science classes.
2. The Cornell Report - a description of Delaware high school science curricula and facilities.
3. Science achievement testing of twelfth graders by Del Mod, and of fourth and eighth graders by the Delaware Department of Public Instruction.
4. The collection and handling of Del Mod data.
5. Mathematics baseline data.

The amount of information relative to Del Mod programs, which is now collected and stored in the Del Mod office, fills over nine looseleaf notebooks, five crates of video and audio tapes, eight trays of IBM cards, and dozens of computer printouts. This has resulted after only two years of data collection.

Del Mod has developed a means of identifying projects and project participants which is absolutely necessary in the day-to-day operation of the System. For this reason, the fourth section of this report would be invaluable to educators contemplating a systems approach to a problem.

I

Videotaping and Video-Analysis of Delaware Science Classes

The Del Mod System sponsored three programs involving video-analysis of science classes in Delaware schools during the 1971-1972 school year. The first was the study of 45 high school teachers. The second, a video-study of teachers involved in Barbara Logan's Field Agent program in Eastern New Castle County, was used as a teaching tool. The third study was a follow-up video-analysis of teachers involved in the first Del Mod project which occurred in the 1970-1971 school year. The latter is a longitudinal study of potentially great value.

The High School Study. Forty-five teachers were randomly selected for videotaping and the Del Mod System employed Dr. Glen Schertz and Mr. Bruce Watt as video technicians to tape the classes of these individuals.

The Flanders method of interaction analysis has been applied to each tape. This method purports to measure student/teacher interaction by isolating ten types of classroom behavior such as teacher lecturing, teacher offering praise, student answering a question, etc. Each incident of classroom behavior is recorded onto a score sheet from which successive pairs of incidents are transferred to a matrix.

The resultant matrix is subjected to a thorough analysis. The ratio of direct to indirect teacher influence over a class is computed. This and other patterns are examined according to suggestions made by Flanders, the designer of the interaction analysis method.

The relationship of these ratios and patterns with other teacher data on file in the Del Mod office were compared. Comparisons such as the relationship of the academic preparation of teachers and their ratio of direct influence over a class were made to determine if the better prepared teacher lectured more than a teacher who was less successful as a college student.

Variables such as age, years of experience, the teachers certificate, discipline (i.e. physics, biology or chemistry) were examined in addition to academic preparation. It was the hope that relationships between easily collected predictor variables and subsequent classroom behavior could be discovered. If the relationships exist then administrators could identify "direct" or "indirect" teacher candidates before they are hired and assigned to classes. Early analysis has revealed some disappointment over the emerging pattern of results. It is also expected that a doctoral dissertation will result from this data.

The Logan/Watt Study. Barbara Logan and Bruce Watt, acting as Del Mod Field Agents, videotaped 60 participants in Miss Logan's Eastern New Castle County program. Miss Logan used the tapes as teaching tools. Meanwhile Mr. Watt applied the Flanders interaction analysis to each tape. The analyses were shared with the teachers in an immediate feedback session. Mr. Watt subsequently prepared a final report listing the scores of the various teacher analyses. Videotaping seems to be a highly effective means of changing teacher behavior, but Mr. Watt has expressed some dissatisfaction with many of the current modes of videotape analysis such as the ten category Flanders technique.

The Field Agent Follow-Up Study. The first Del Mod project was conducted by John F. Reiher in 1970-1971. At that time Mr. Reiher videotaped many of the 60 participants in his program. During the past year a follow-up study of these individuals was designed to achieve three goals:

1. Some of the participants needed encouragement to use the techniques and/or materials introduced by Mr. Reiher.
2. A longitudinal study of these individuals was deemed desirable by this writer.
3. The opportunity to videotape these teachers and include the videotapings in the longitudinal study was too appealing to ignore.

Of the 65 original participants, 49 were available for inclusion in the follow-up study. Although a total of 60 of these people have been taped, only 30 have been taped both years. Mr. Watt will retape these individuals in the spring of 1973. The final report of this study will be written at the end of the fifth year.

Comments on Videotaping. Videotaping is best employed as a teaching device. As a method of searching for the "best way of teaching" it leaves something to be desired because the modes of analysis are primitive. A multi-camera approach with syncronized playback might improve analysis but the cost would be prohibitive.

Why videotape? Current methods of analysis may be inadequate, but over forty studies are in progress which offer hope of breakthroughs. The Del Mod tapes are a permanent record of teacher behavior which can be re-analyzed at any time.

II
The Cornell Report

In 1969, Charlotte Purnell compiled the Status of Science Teaching in Delaware. This booklet catalogued the strengths and the needs of Delaware schools. To measure the impact of this report three years after its distribution, the Del Mod System employed Dr. Ruth Cornell to visit all of Delaware's high schools.

Dr. Cornell interviewed principals, department heads and as many science teachers as she could. Usually, science departments held special meetings during Dr. Cornell's visits. An additional duty performed during these visits was the establishment of two-way communication between the schools and the Del Mod System. It had been demonstrated that many teachers had never heard of Del Mod despite frequent mailings and other approaches to the schools. School secretaries and/or administrators had frequently discarded Del Mod (and other) communication documents as "trash" mail. Dr. Cornell not only made these individuals aware of Del Mod, but she suggested that the Del Mod office direct future mailings to specific responsible individuals. The Cornell Report is on file in the Del Mod office.

III
Science Achievement Testing In Grades Four, Eight, and Twelve

A slightly modified version of the Sequential Test of Educational Progress (STEP), Form 3, was administered by the Delaware Department of Public Instruction to children in grade 4 throughout the state, and STEP, Form 4, was administered, intact, to all children in grade eight in April, 1972. The State of Delaware tested the children, scored the tests, and will share the Department of Public Instruction results with the Del Mod System.

When the results are available, these tests will be analyzed to determine the need, if any, to improve teaching in any specific area of science in either grade.

Students in grade twelve were selected by Del Mod for participation in a testing program which used 50 of the 54 items from the National Assessment Test of seventeen year olds (see Womer, 1970). Process was not tested.

Since many of these students had studied science with varying degrees of interest, the results were analyzed by school, by sex, by science background, and by college aspiration of each respondee. It was discovered that males significantly out-performed females on the test. It was also demonstrated that males had studied more science in high school. The latter discovery explains the former. The school differences were negligible. Although suburban school students scored well on the test, this too was a factor of greater participation in science courses.

Comments on Achievement Testing. The Del Mod System can take some pride in the fact that the testing was completed during its first year of operation, and that the instruments used enjoy a favorable national reputation as assessment tests.

Both forms of the STEP test and the National Assessment Test items can be readministered several years hence and the results used to gauge Del Mod's impact on science education in Delaware. It should be noted that the Department of Public Instruction modified 15 of the 50 items on the fourth grade test.

IV

The Collection and Handling of Del Mod Data

The vast amount and variety of data handled by the Del Mod System has required development of a system of data identification which is simple, accurate, and efficient. Data maintenance has accounted for the majority of the Research Director's time.

The system is simple. Each science teacher in Delaware has been assigned a seven-digit number. When these numbers are broken down it is possible to accurately identify Del Mod participants by name, school or school district. In addition, each Del Mod project is dated and numbered. Project 70-1 is the first project of 1970, etc. When a teacher participates in a project the project number is listed after his name in the Del Mod rosters.

The teachers are also identified by social security numbers. These permanent numbers are useful for several reasons: Many project participants receive stipends or allowances which are reported to the Federal government. Female teachers often change their names by marriage, parochial school teachers are known by religious names as well as their given names, and several people may have the same name.

The Del Mod rosters also keep track of transfers from school to school. Thus, a typical page from the rosters may contain several bits of information useful to project administrators. These rosters are prepared with teachers' names in alphabetical order, and they are prepared with school-by-school lists of science teachers.

All teacher data is kept on computer cards which are updated constantly. Printouts of these cards are distributed exclusively to Component Coordinators several times a year. The importance of these lists cannot be understated. They are used to prepare mailing labels. They are used to determine Del Mod effectiveness in developing projects for various schools, districts, or science disciplines. They are used to measure teacher turnover.

Furthermore, as other and more sensitive data are collected, such as teacher videotapes or transcript data, these data are described solely by the teacher identification number. It is inadvisable to make such data public.

It has become a Del Mod policy to collect and summarize transcript data for certificated science teachers. The age, years of teaching experience, undergraduate and graduate school grades in science, mathematics, and education have been collected and stored for over 400 teachers.

The Test on Understanding Science (TOUS) has also been administered to almost 400 of these teachers, and will be readministered several years from now to gauge Del Mod impact on science teachers. The scores on these tests are stored, item by item, on computer cards, as are student scores on the National Assessment Test.

Project Reports. The majority of Del Mod project directors have made an effort to evaluate their projects along guidelines suggested by the Del Mod System.

Individual project reports for many of the projects described in this annual report are on file in the Del Mod research office. These reports describe participants, materials, methods, evaluations, and schedules for the various projects. Reports by project directors have greatly influenced the component coordinators and their willingness to support future project proposals by these directors.

Comments About Data Collection. Current, useful, and accurate data require constant attention. Del Mod has tried to answer as many questions as possible about science education in Delaware only to find that there are many requests for data which have not been collected. Modern school organization renders some types of data collection difficult. Enrollment data is among the hardest to collect because some schools employ traditional block scheduling while others employ modular scheduling. Sometimes courses last only a few weeks.

Teachers and administrators have been exceptionally cooperative. It should be noted that this cooperation exists because Del Mod has been effective in bringing programs to the schools, and because these programs are useful. A large number of teachers have agreed to take the TOUS test or submit to videotaping "only if it is for Del Mod."

V
Mathematics Baseline Data

William Geppert, State Supervisor of Mathematics, has prepared a booklet on the Status of Math Teaching in Delaware. This booklet is the product of a questionnaire circulated by Mr. Geppert.

A complete roster of mathematics teachers in Delaware has been prepared by Mr. Geppert and the Del Mod Research Director. This roster is coded according to the Del Mod format, and includes social security numbers. College transcript data for each teacher have also been collected and summarized (although not analyzed at this writing).

The completion of this work has made it possible for mathematics to be included in the Del Mod System during the 1973-1974 fiscal year.

VI
Participant Data

The following three figures are summaries of participation and cost for the twenty-five Del Mod projects conducted during the 1971-1972 fiscal year. A fourth figure is included which summarizes the findings of the Cornell Report on Delaware high schools.

Figure 1 is an accounting of Del Mod participants in each Delaware school district. There were 448 new participants in Del Mod projects during the 1971-1972 school year. Several people have participated in two, three, four or five projects since 1970. The majority of repeat participants appear on University of Delaware rosters.

There were 34 "miscellaneous" participants who were, for the most part, undergraduate preservice, or full-time graduate students at the University. Of this number, nine participated in Dr. Rick's UPSTEP program.

Del Mod has not yet contacted Delcastle High School which is a vocational-technical school. This is an oversight which will be corrected.

Figure 1
PARTICIPANTS IN DEL MOD PROJECTS LISTED BY SCHOOL DISTRICTS

PROJECT	71 1	71 2	71 3	71 4	71 5	71 6	71 7	71 8	71 9	71 10	71 11	71 12	71 13	71 14	71 15	71 16	71 17	71 18	71 19	71 20	71 21	71 22	71 23	71 24	71 25	TOTAL
DISTRICT																										
Alexis I. Du Pont...	1		1											43	2										1	48
Alfred I. Du Pont...	3	11	2							3					3	3				1					2	28
Appoquinimink.......																2									1	3
Caesar Rodney.......	2		1			3	10		2						1			7				1				27
Cape Henlopen.......						2										1		3								6
Capital.............	2	1				8			17						3	2		16				3	2		2	56
Claymont............	1	1						5							2	10							2		2	23
Conrad..............	2							7							1								1		1	12
De La Warr..........	1	1						6	2						1										1	12
Delmar..............						1												2								3
Indian River........						5	11										1	6				5	1			29
Lake Forest.........	1					2	28											2				2				35
Laurel..............	1															1		2								4
Marshallton-McKean..	1	1							1						1	1	29		17		1		1		1	54
Milford.............							5		3						1	2		4				2	1		3	21
Mount Pleasant......	2	1						6							2	14										25
Delcastle High......																										
New Castle- Gunning Bedford...	3		2					13	1		24				1								3			47
Newark..............	2	5		12												2										21
Seaford.............						4												2				3	1			10
Smyrna..............			2			1	6		1									1				1				12
Stanton.............		1				1			1				12		1			1				1			2	21
Wilmington..........		1			15										1											18
Woodbridge..........																		3								3
Private.............	1	3													1											5
Parochial...........			7					23	3			11			1	1							1		3	50
Miscellaneous.......	5	4	3			2			1						1	6						1		9	2	34
Total	30	30	18	12	15	29	60	60	32	3	24	11	12	43	23	45	30	49	17	1	1	19	13	9	21	607
First participants	28	29	17	10	15	11	59	55	32	2	24	10	11	43	8	43	28	0	3	1	0	2	2	9	6	448
Second "	2	1	1	2		18	1	5		1		1	0		12	2	2	30	13		1	7	5		8	112
Third "													1		3			18	1			1	2		5	31
Fourth "																		1				8	2		1	12
Fifth "																						1	2		1	4

Figure 2 is a summary of the cost of the various Del Mod academic projects during the 1971-1972 fiscal year. The sources of cash contributions are listed for each project. Many of the projects reported in-kind contributions which were quite valuable, but these were not used in determining the actual cash cost.

The Del Mod Research Director computes the cost per manhour for each project with the realization that legitimate inequities exist, but per-hour cost is the least common denominator for all projects. It is readily apparent that by the nature of some developmental projects the cost per manhour shows a wide range as contrasted with those projects concerned with implementation.

Figure 2
COST AND COST-PER-HOUR OF DEL MOD PARTICIPATION FOR EACH 1971-1972 PROJECT

PRO- JECT	COMPONENT	PROJECT DIRECTOR	PARTI- CIPANTS	APPROXIMATE COST	SOURCES OF FUNDING N.S.F.	LOCAL	PRIVATE	MAN- HOURS	COST PER HR.
71- 1	U. Del.	*Yolles	30	$ 21,839.00	$ 21,839.00	$	$	3600	$ 6.07
71- 2	U. Del.	*Stegner	30	27,100.00	9,600.00		17,500.00	3600	7.53
71- 3	U. Del.	*Schweitzer	18	19,150.00	6,550.00		12,600.00	2160	8.87
71- 4	Director	Bonney	12	4,035.95	2,600.00	1,435.95		1440	2.80
71- 5	Director	*Clark	15	7,500.00			7,500.00	960	7.81
71- 6	U. Del.	*Geens	29	1,165.00	1,165.00			870	1.34
71- 7	Director	*Gussett	60	20,425.00	20,425.00			5400	3.78
71- 8	Director	*Logan	60	47,425.00	22,425.00		25,000.00	6300	7.53
71- 9	D.P.I.	Reiher	32	200.00	200.00			256	.78
71-10	Director	Miller	3	2,500.00	1,500.00	1,000.00		270	9.26
71-11	D.P.I.	Johnson	24	2,000.00	1,000.00	1,000.00		576	3.47
71-12	Director	Delaney	11	1,800.00	1,000.00	800.00		660	2.73
71-13	Director	Jenny	12	6,500.00	1,500.00	5,000.00		648	10.03
71-14	Director	Hounsell	43	25,500.00	1,500.00	5,000.00	19,000.00	2880	8.85
71-15	U. Del.	*Yolles	23	6,426.67	6,426.67			1440	4.46
71-16	U. Del.	Brown	45	1,900.00	1,900.00			1710	1.11
71-17	D.P.I.	Reiher/Geppert	30	200.00	200.00			480	.42
71-18	D.P.I.	*Burkhardt	49	2,481.99	2,481.99			2205	1.13
71-19	D.P.I.	Reiher	17	1,500.00	1,000.00	500.00		510	2.94
71-20	Director	Reynard	1	300.00	300.00			60	5.00
71-21	Director	Cleland	1	300.00	300.00			60	5.00
71-22	U. Del.	*Geens	19	1,000.00	1,000.00			570	1.75
71-23	U. Del.	*Uffelman	13	19,410.00	17,410.00		2,000.00	585	33.18
71-24	Del. State	*Ricks	9	34,270.00	30,670.00		3,600.00	1620	21.15
71-25	U. Del.	*Yolles	21	5,623.33	5,623.33			1125	5.00
Totals:			607	$260,551.94	$158,615.99 (60.9%)	$14,735.95 (5.7%)	$87,200.00 (33.5%)	39,985	$ 6.52

* Project directors received salaries which are included in budgeted costs.

Figure 3 is a summary of original and repeat participations in Del Mod projects. The Del Mod System hopes to conduct programs which will eventually involve every science teacher in Delaware.

Figure 3
Original and Repeat Participants in
Del Mod Projects by Component

	PARTICIPATION					
	Original	2	3	4	5	Total
University of Delaware	146	56	11	11	4	228
Delaware State College	9	0	0	0	0	9
Department of Public Instruction	87	45	19	1	0	152
Director	206	11	1	0	0	218
Total	448	112	31	12	4	607

The fourth and final figure is a summary of the science enrollments in Delaware high schools. The source for these data is the Cornell Report of 1971-1972.

Miscellaneous science courses which are usually taught for less than a full school year are listed on the page following the enrollment data. These courses are keyed to the numbers of the schools in Figure 4.

Figure 4
SCIENCE ENROLLMENTS IN DELAWARE HIGH SCHOOLS 1971-1972
Note: Miscellaneous courses are listed on the following page.

		1971-72 Science Enroll-ment	BIOLOGY 313 Sections						CHEMISTRY 150 Sections				PHYSICS 68 Sections			MISC. 103 Sec.
			BSCS Blue	BSCS Grn.	BSCS Yel.	BSCS SM	Modi-fied	Adv-anced	CBA	CHEMS	Modi-fied	Adv-anced	PSSC	HPP	Modi-fied	
1	Alexis I. Du Pont	910	232			60		48	55	55		6	143			311
2	Brandywine	723	285							238			65		20	115
3	Concord	994	248	130		36				189				127		264
4	Middletown	141			92						27				7	15
5	Caesar Rodney	411					180	60		152					19	
6	Dover A. F. Base	192					60	5			26				5	96
7	Cape Henlopen	348					24			27	114				80	103
8	Dover	795	240			63				160	82		46			204
9	Claymont	561	25				387				41			12	45	51
10	Conrad	686	94		175	112				100	89				96	20
11	De La Warr	395			70		191	20		55				16		43
12	Delmar	219					100				24				20	75
13.	Indian River*	8													8	
14	Sussex Central	491	47	81	114		41				89				96	23
15	Lake Forest	325		86			98				36				6	99
16	Laurel	251					160				58				12	21
17	McKean	718				223	135				241		22	97		
18	Milford	349					216	13			64				18	38
19	Mt. Pleasant	1343	283		220		54			73	588		63	62		
20	Wm. Penn	749			204	25	200			123					35	162
21	Christiana	836	144		381		23			154			14	14	16	90
22	Newark	981	45		353	104		27		86	104	49		9	96	108
23	Seaford	389		98	100			41		100				25	25	
24	Smyrna	352			61	142	46	8			62				17	16
25	John Dickinson	921				80	420			145	104			50		122
26	P. S. Du Pont	328	50		50		80	40			60	10			25	13
27	Howard	210					161				30					19
28	Wilmington	281					152				99	12		18		
29	Woodbridge	120					90				10		10			10
	Subtotals		1693	395	1820	845	2818	262	55	1657	1948	77	363	430	646	2018
	Totals	15027	7833 = 52.1%						3737 = 24.9%				1439 = 9.6%			2018 = 13.4

* Data available for only one course

Miscellaneous Science Courses	School Number
Advanced Physics	8
Advanced Physical Science	6
Advanced Science	14
Astronomy	7, 8, 9
Bacteriology	7
Biology (CP)	1, 22
Bio-Chemistry	26, 27
Botany	23
Chem. Investigative Approach	22
Chem-Phys	3,20
Cytology	22
Earth Science	12, 18, 21, 22
Earth Science II	9
E.S.C.P.	9, 21
E.S.C.S.	10
Ecology	1, 21, 22
Electronics	25
Engineering concepts	25
Environmental Studies	24
E.M.I.	24
General Science	4, 7, 11, 15, 24, 26, 28, 29
Geology	21
Human Physiology	7
I.I.S.	2, 8, 18
I.M.E.	20
I.P.S.	2, 8, 15
I.S.C.S	8
Lab. Technology	22
Life Science	12, 27
Marine Biology	23
Matter and Energy	28
Microbiology	8, 15, 22
Oceanography	7
Patterns and Processes	8, 17, 20, 21, 24, 25
Physical Chemistry	19
Physical Science	4, 5, 6, 7, 12, 15, 20, 24, 26
Physiology	8, 9
Radio Isotopes	7
Space Science	22
Technical Chemistry	1
Vocational Chemistry	8, 21
World of Physics	2

Financial Summary

Research Director

Total Amount Allocated by NSF - $ 20,000.00

Total Amount Expended - $ 18,676.48

Salaries and Fringe Benefits - 16,619.02
Supplies and Expense - 165.75
Travel - 1,891.71

Carried Over to FY 73* - $ 1,323.52

*Includes some unpaid expenditures and fringe benefits

DELAWARE TECHNICAL AND COMMUNITY COLLEGE

DELAWARE TECHNICAL AND COMMUNITY COLLEGE

Delaware Technical and Community College occupies a sometimes oblique but active role in the Del Mod System through its allocation of space and the development of programs which are within the scope of a two-year technical and community college.

The Science Education Technician Program will allow thirteenth and fourteenth year students to participate in an experimental program designed to help teachers improve learning experiences for pupils in schools and colleges. These students will work actively with practicing teachers.

The Science Resource Center has provided the people and materials for inservice training throughout the year. It has enabled schools to incorporate new materials by providing opportunities for tryout and review. New and different strategies have been made available for teachers by assisting the Field Agent and by responding to requests. There has been increased exposure to the community through its facility for meetings as well as through the two advisory committees for Delaware Technical and Community College, Southern Branch, and the Science Education Technician Program.

The Component Coordinator has tried to implement the cooperative working agreement with other agencies to bring about changes and to institutionalize alterations by helping to make it all happen. An effort has been made through components of Delaware Technical and Community College, Southern Branch, to communicate technical college philosophy to other parts of the Del Mod System.

Financial Summary

Delaware Technical and Community College

Total Amount Allocated - NSF		$ 55,600
Science Education Technician	$ 7,500	
Science Resource Center	36,200	
Component Coordinator	11,900	
	$ 55,600	
Total Amount Contributed by Delaware Technical and Community Center		$ 8,300
Total Amount Expended		$ 48,000
Science Education Technician	$ 6,200	
Science Resource Center	30,200	
Component Coordinator	11,600	
	$ 48,000	
Total Amount Carried Over to FY'73		$ 7,600
Science Education Technician	$ 1,300	
Science Resource Center	6,000	
Component Coordinator	300	
	$ 7,600	

Delaware Technical and Community College Science Resource Center -

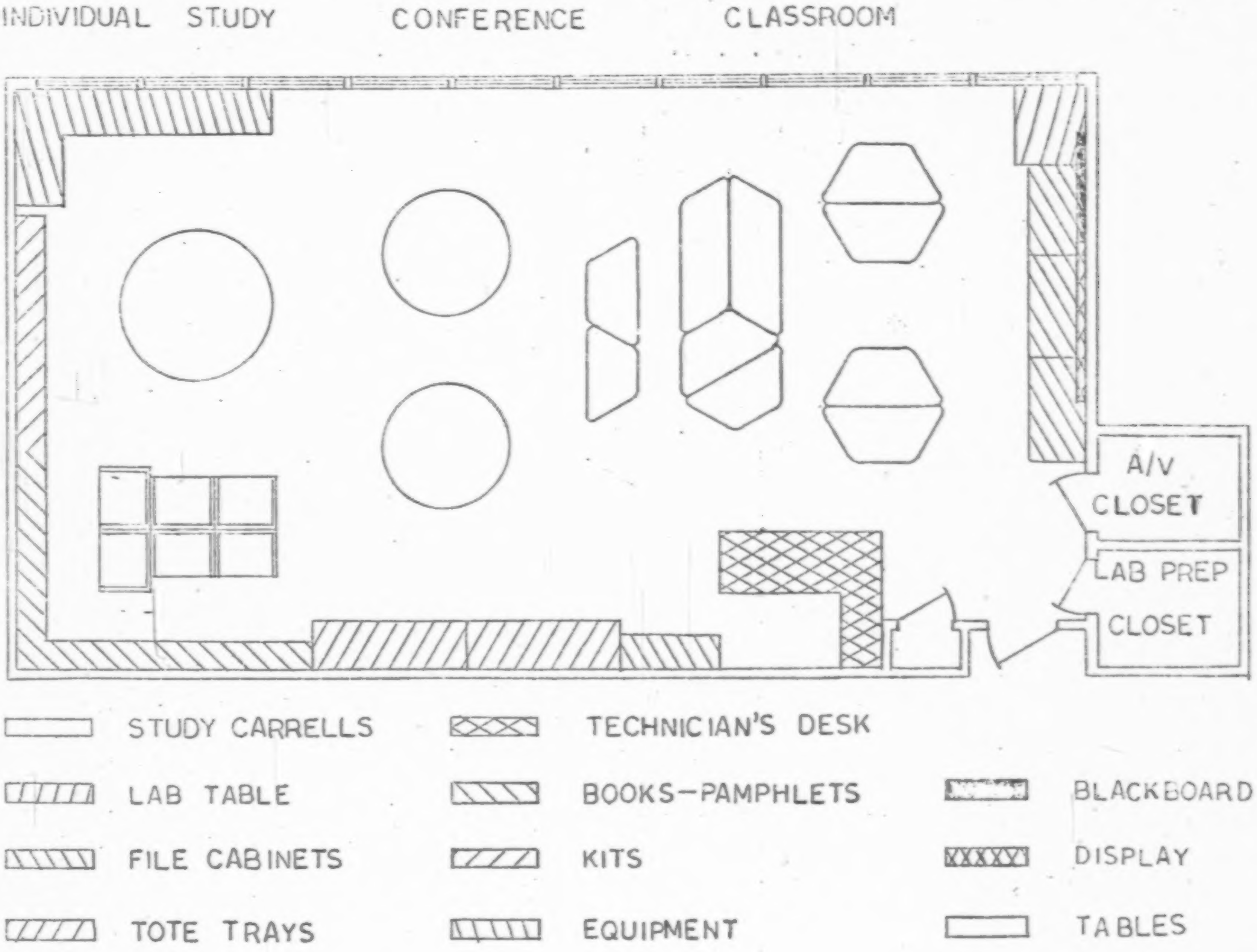
1. Population Characteristics -

The Science Resource Center concentrated on supporting programs for middle school and upper elementary science teachers although the Center accessioned some texts, periodicals, and materials for high schools and answered any requests made by curriculum directors, teachers and others. It has served student teachers home during vacation periods in order to assist them with their needs. Both the physics and chemistry departments of Delaware Technical and Community College have evaluated the Chem Study and Harvard Project Physics materials for use in their own classrooms.

2. Organizational Patterns -

The charts on the following pages represent the patterns for the Science Resource Center. The Component Coordinator and this component have been operating essentially in accordance with the patterns. Following this chart is a floor plan of the Center indicating the way in which it has been organized to implement its three basic purposes for individual study, school and community conferences and inservice learning experiences.

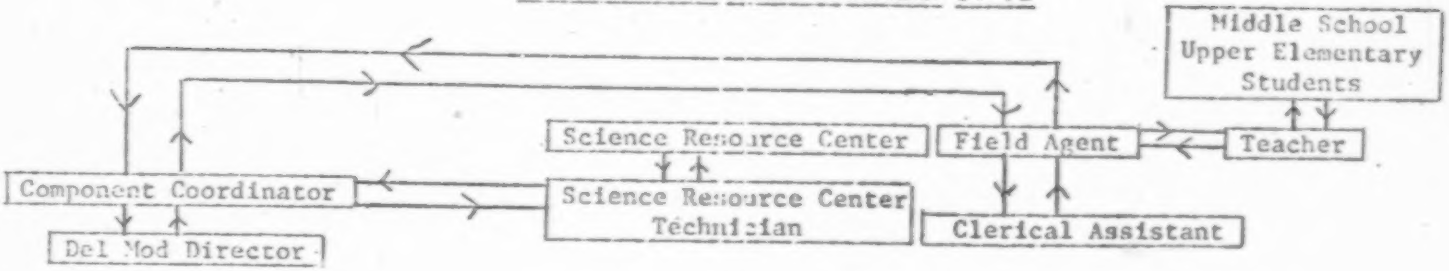
Delaware Technical and Community College, Southern Branch, essentially is an implementor of the System's objectives. Needs had been established prior to D.T.C.C.'s initiation. In developing appropriate actions, D.T.C.C. has fed some suggestions into the System. With built-in designs for immediate feedback it was possible to meet needs quickly and to change emphasis in efforts, e.g., when teachers were not flocking to the Center in droves, more "outreach" ideas were developed and Center hours were shifted to begin earlier in order to receive teachers' calls before school started and to close earlier since very few used the Center after 8 p.m.


INDIVIDUAL STUDY
CONFERENCE
CLASSROOM
A/V CLOSET
LAB PREP CLOSET
STUDY CARRELLS
LAB TABLE
FILE CABINETS
TOTE TRAYS
TECHNICIAN'S DESK
BOOKS-PAMPHLETS
KITS
EQUIPMENT
BLACKBOARD
DISPLAY
TABLES

G. WILLIAMS

SCIENCE RESOURCE CENTER

FEEDBACK INFORMATION PATTERN FY'72


Middle School
Upper Elementary
Students
Science Resource Center
Field Agent
Teacher
Component Coordinator
Science Resource Center
Technician
Clerical Assistant
Del Mod Director

RESOURCE AND ACTIVITIES CHART

CENTER COMPONENTS

science textbooks (K-12), science kits, materials of major curriculum projects, trade catalogs, filmloops, filmstrips, pamphlets and brochures, periodicals, newsletters, science tests, auto-tutorial materials, legislative bills, expendable materials and miscellaneous items.

***

duplicating, copying and audio-visual equipment.

***

informal meeting area, classroom area and study area

FIELD AGENT USE

tutorial and informal meetings, formal demonstrations, preservice and inservice training, demonstration of learning techniques, instructional materials.

CLERICAL ASSISTANT

typing, scheduling, preparing experimental equipment.

TEACHER USE

classroom implementation

STUDENT USE

learning experiences

CENTER TECHNICIAN RESPONSIBILITIES

ordering materials, processing materials for perusal and circulation; providing research service.

COMPONENT COORDINATOR RESPONSIBILITIES

implementation, supervision and evaluation.

DEL MOD DIRECTOR RESPONSIBILITIES

overall coordination and leadership; funding approval.

smp/11/8/71

3. Activities -

In establishing a resource lbirary for science personnel during FY '72 over 500 catalogs, 1200 texts and 60 periodicals were accessioned in addition to 105 filmloops; all major elementary and high school curriculum studies; hundreds of pamphlets, brochures and newsletters; hundreds of giveaway copies of ideas; slides and transparencies for BSCS and HPP and a community resource list of speakers and places to visit.

In providing an operational base for the Field Agent, a technician and clerk handled correspondence; secured materials needed for sessions; xeroxed and typed materials for inservice training, answered telephones; prepared experiments; furnished reports.

In making space for meetings of science personnel, district supervisors, inservice programs and workshops and community advisory committee, the following activities were hosted:

Regular district Field Agent group meetings (five districts involved)
Practice sessions for Millsboro teachers
AAAS Field Agent workshops
SCIS Day (100 teachers)
AAAS University of Delaware Workshop
Department of Public Instruction career math workshop
Four courses (leadership training, two sponsored by University of Delaware, one from the Indian River District and one from the Cape Henlopen District)
Twenty-seven meetings including those sponsored by the advisory committees, Field Agent, science community, education community and staff meetings
Services such as lending materials, giveaway materials, dry mounting, telephone requests and written requests from teachers

Hundreds of reprints, pamphlets, brochures, diagrams, experiment procedures are available to teachers. The idea file helps teachers expand teaching units, develop

Del-Mod Science Resource Center
Delaware Technical & Community College
Southern Branch

Acc. No. 416

AAAS

PART D

SUPPLEMENTARY KIT

PART	DESCRIPTION	EXERCISE
4025	1 pkg. of 9 different bird illustrations	b
4026	1 construction area illustrations, black and white poster	b
4028	1 box containing 1 set of wood boring tools	b
8000	8 real walnuts	b
8001	8 real Brazil nuts	b
8002	8 real pecan nuts	b
8004	8 real almonds	b
8147	1 roll of adding machine paper	c
8301	1 liter (1 qt.) container	e
4044	1 pkg. of 50 drinking straws	e
4058	1 bottle of liquid starch (in closet)	g
8123	1 bottle of alcohol (in closet)	g
8231	1 bottle of liquid detergent (in closet)	g
8248	4 cups 210 ml (7 oz.)	h
4081	2 sheets of aluminum foil	k
4084	1 pkg. of 30 styrofoam weighs (1 gram cubes	k
8150	1 food warming candle	k
8334	1 box containing 1 alcohol burner	k
8344	24 lids for wide-mouth containers	k
4096	1 tube of white petroleum jelly	l
4102	1 pkg. of 6 birthday candles	m
4103	1 pkg. of 6 tall candles	m
4132	1 pkg. of 150 die-cut arrows	p
4133	1 large eye hook	p
4134	2 pails with covers (pails in closet)	p
8025	1 box of assorted rubber bands	p
4146	1 pkg. of 25 rectangular blotters	q
4165	1 pkg. of 8 sheets of colored transparent cellophane	s
4166	1 pkg. of 12 clothes pins (pinch type)	s
8256	1 rectangular box, folded flat	s
4168	1 pkg. of 9 punch-out construction paper shapes	t
4169	1 pkg. of 12 rods	t
4170	1 pkg. of 12 index cards	t
4178	1 pkg. of cotton balls	v
4179	1 pkg. of 50 small yellow plastic 1-centimeter cubes	v

Date Borrowed____________

Date Due________________

Name__________________________

School_________________________

School Phone____________________

Home Phone_____________________

EVALUATION OF SCIENCE RESOURCE CENTER MATERIALS

Science kit, text, etc., used:______________________________

Please help us help others by completing the following information:

Any specific good features______________________________

____

____

____

____

Any specific weak features______________________________

____

____

____

____

____

Any other comments______________________________

____

____

____

If there were money in your school's budget, would you order this material? ____ Yes ____ No

Number of students using material__________Grade Level__________

School______________________________

Teacher______________________________

new units and make low cost objects for use in the classroom. A listing of speakers to visit classrooms as well as suggestions for trips and tours and a resource information answering service are provided by the Center. Over 500 scientific supply houses and publishers are made available for teachers wishing to have help with price lists on supplies and curricula. Moreover, samples of printed tests for such curriculums as BSCS and standardized tests are made available for review. There is also a miscellaneous vertical file with newspaper and magazine articles, tables and charts, lists of free materials and science bibliography and suggestions by grade level. The Resource Center technician assisted teachers with dry mounting and made the materials available for those who wished to make their own copies. Spirit masters, mimeo masters and transparencies can be made by both technician and teacher in the Center.

Available for tryout is a 16mm projector, 8mm projector, cassette tape recorders, reel-to-reel tape recorder, filmloop projector, filmstrip projector, overhead projector, slide projector, sound filmstrip projector, record player and screen as well as auto-tutorial material and facilities.

The picture of the technician's day may illustrate some of the activities and services provided by the Center. A 12-hour day convenient to teaching hours starts at 8 a.m. In order to provide teachers with materials on loan, the technician devised a system which will be used at the other two locations. Examples of the forms may be found on the following two pages. Features of this system not only enable kit materials to be broken down in order for expendables to be replaced but also for the additional feature of requesting teacher evaluation of any of the information which is used. This evaluation sheet is one way the Center evaluates its effectiveness. If a teacher wishes to remove materials from the Center, plastic tote bags with Del Mod identification are given to each patron. This is one way the Center enhances its viability.

Beyond the lending operation the technician prepares purchase orders; checks and accessions all types of materials; maintains a cost record for all of Del Mod in Southern Branch; keeps statistical records on Center usage; assists Field Agent by making appointments and meetings; helps patrons with questions, visual aids, etc.; assists with displays and with the Del Mod Advisory Committee (in Southern Branch); and handles correspondence.

4. Assessment of Success -

It has been stated that the Science Resource Center is the pivot around which all phases of the Del Mod System revolve and is the locus for all activities. A tally of content and a random sampling of anecdotal materials verify this statement. During February 1972 over 350 letters were sent to Sussex and lower Kent County school personnel inviting them to preview the Center. Since February 27 community and advisory committee meetings have been held in addition to over 1200 individual visits for previewing, studying and assessing. Over 300 books, periodicals, kits and films have been borrowed from the over-500 prepackaged science kits and from the 64 tote trays filled with hundreds of components; 5500 giveaways such as price lists, idea reports, brochures, catalogs, free material lists and Del Mod plastic tote bags have been distributed. Sixty telephone requests have been honored since the Center opened and 300 dry mounts, transparencies and ditto masters have been furnished to patrons. Before the opening only 14% of the area teachers were participating in Del Mod projects. After resources were centralized in Georgetown the number of teachers from various school districts participating in activities and Center usage increased to 50%

There is evidence that savings in purchasing have been effected, for example, one Indian River teacher with $100 to spend tried several units before she chose those to be ordered. Another decided against the purchase of material advertised in a trade magazine after she borrowed this material for use in the classroom. From the advertisement she thought it would be "just the thing but it was much too advanced for my students."

Another telling effect of the Center is evidence of a change in ordering patterns from textbooks to activity-oriented materials available in the Center. From evaluation sheets and general survey materials it now appears that 85% of the users either have ordered or will order the type of materials borrowed from the Center or tried out in the Center for the first time.

One of the most exciting results of use of materials borrowed from the Center was the student developed project which resulted from their teacher's having borrowed the Batteries and Bulb unit. They worked on their project in regular class, during recess and in homeroom periods. At least eight other schools who had clung to the textbook have purchased or are planning to purchase the Batteries and Bulb unit after having seen the student project and the ESS materials.

Another teacher was excited because a graph for which she had been unable to make a transparency was needed to help her students to learn about decimals in graphing. Although she had been told that a transparency could not be made with the type of graph she was using, the Technician was able to help her in the Center.

Teachers like to read evaluations of materials made by other teachers and this information has been made available along with community resource lists and the like. One school had AAAS for fourth graders but many parts in the student boxes were missing. There was no teacher material. Teachers from this school were delighted to obtain a complete listing of all parts and to look over the complete unit. For the first time they will be able to use AAAS. One principal admitted to a complete about-face concerning the value of the Center after a session in it with the Technician and the Field Agent. Many times employees have heard "It can't help but succeed with such enthusiasm as all associated with Del Mod have shown." A teacher on SCIS Day said "This is so exciting. I brought papers to grade and haven't looked at them."

Teachers and principals indicated that they appreciate the savings of their time in searching for answers since they call the Center and the phoning or writing is done for them. One of the best signs of success is the fact that teachers have copied Center displays for use in their own rooms, e.g., those on metrics, temperature and optical illusions.

The enthusiasm which greets patrons seems to have served them rather than having been told all the reasons why something could not be done. This fact is mentioned because many times people who are tentative about indicating that they do not know, find it difficult to get the answers.

Financial Summary

Science Resource Center

Total Amount Allocated, NSF -		$ 36,200*
Total Amount Expended -		$ 30,200
Furbishings -	$ 6,200	
Salaries -	4,600**	
Materials	22,400	
	30,200	
Total Amount Expended, Delaware Technical and Community College -		5,400
Total Amount of NSF Allocation Carried Over to FY '73 -		6,000

* Reflects $2,000 transferred from Field Agent program for secretarial assistance

** Two employees worked less than a full year

Delaware Technical and Community College Science Education Technician -

1. Population Characteristics -

   The target population for the Science Education Technician program was expanded from middle school level to the more pragmatic one of considering technician trainees for those institutions who seemed most willing to commit funds to employ the technicians after their internship. The age level groups to be served will run from elementary through baccalaureate programs.

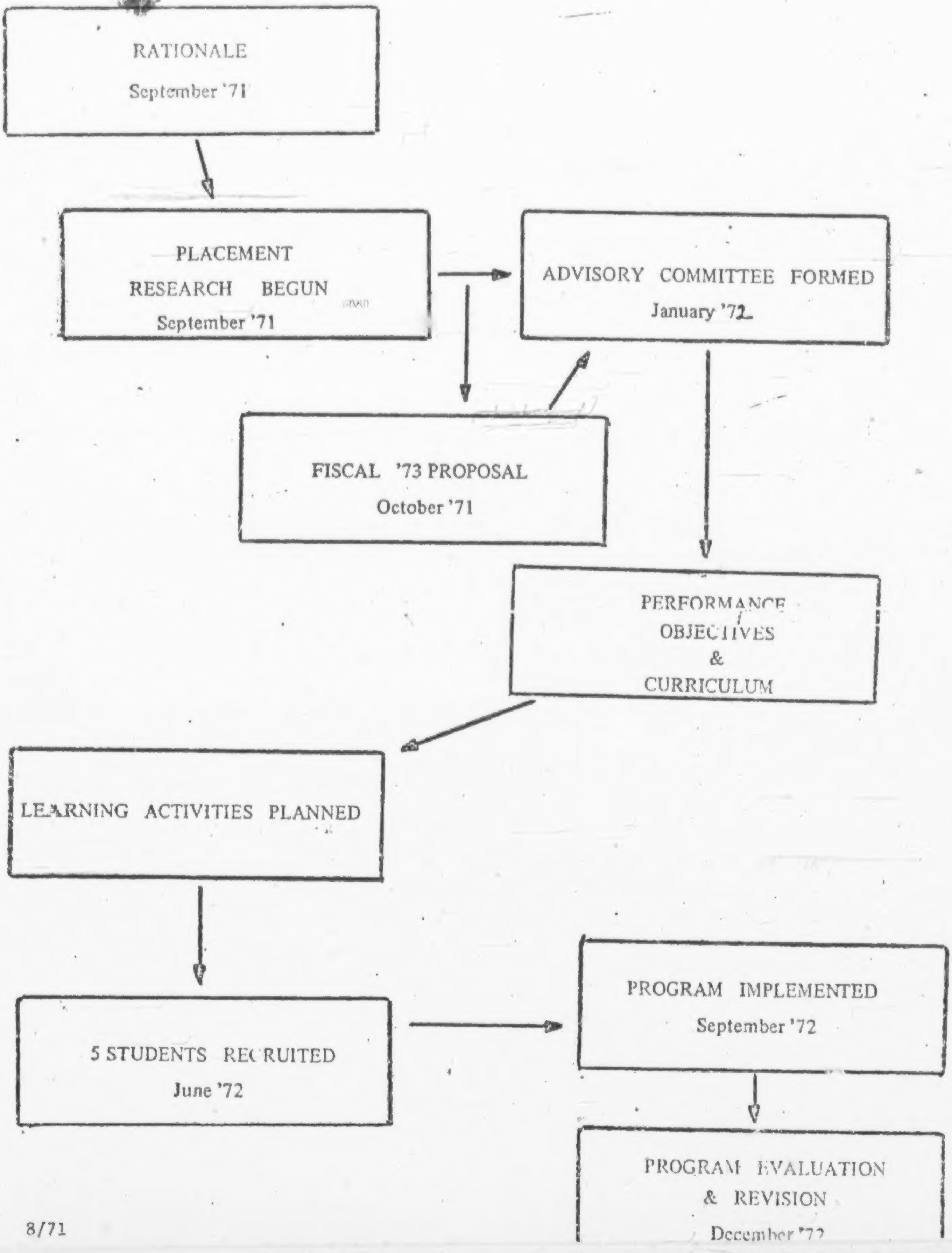
2. Organizational Pattern -

   At the outset a PERT chart was devised for development of the Science Education Technician program. This chart is reproduced on the following page.

3. Activities -

   One of the most effective activities of the Science Education Technician program was the successful implementation of a curriculum designed with the cooperation of Delaware State College and the University of Delaware. A plus-factor in this program was not only the fact that certain curriculum barriers were broken down in the "doing" of this curriculum but also that it was built on a flexible base having the ability to enable students to move directly into DTCC's Laboratory Technology programs in the event two years of effort to have the public schools pay for science education technicians fails. Another "plus" in the design is the relative ease with which an associate in applied-science-technician program will be able to move into a baccalaureate program either at Delaware State College or the University of Delaware. A sample of the curriculum also follows this page in addition to a summary of the role of a science education technician developed by the advisory committee and a subcommittee on curriculum.

FY'72 SCIENCE EDUCATION TECHNICIAN PROGRAM - DTCC


RATIONALE
September '71
PLACEMENT
RESEARCH BEGUN
September '71
ADVISORY COMMITTEE FORMED
January '72
FISCAL '73 PROPOSAL
October '71
PERFORMANCE
OBJECTIVES
&
CURRICULUM
LEARNING ACTIVITIES PLANNED
5 STUDENTS RECRUITED
June '72
PROGRAM IMPLEMENTED
September '72
PROGRAM EVALUATION
& REVISION
December '72

8/71

SCIENCE EDUCATION TECHNICIAN
TENTATIVE CURRICULUM

First Quarter

RR 120	Advanced Reading	0	3	1
RE 121	English I	3	0	3
*RM 121	Tech Math I	4	0	4
*LA 141	Chemistry I	3	2	4
*LA 131	Micro Biology	3	2	4
LA 123	Lab Terminology	2	2	5
		15	9	19

Second Quarter

RE 122	English II	3	0	3
*RM 122	Tech Math II	4	0	4
*RP 101	Physics I	3	2	4
*LA 142	Chemistry II	3	4	4
SY 121	Typing I	5	0	5
		18	6	20

Third Quarter

RH 103	Psychology I	3	0	3
BA 291	Internship program	0	15	5
BA 290	Job Problem Seminar	3	0	3
*RP 102	Physics II	3	2	4
*LA 143	Chemistry III	3	3	4
		12	20	19

Fourth Quarter

BA 293	Internship	0	15	5
BA 292	Job Problem Seminar	3	0	3
*RM 143	Business Tech Math III	4	0	4
RE 123	Business English	3	0	3
*LA 102	General Biology I	3	3	4
		13	18	19

Fifth Quarter

BA 295	Internship	0	15	5
BA 294	Job Problem Seminar	3	0	3
RH 102	Political Science	3	0	3
IN 213	Fundamentals of Safety Engineering	3	0	3
*LA 103	General Biology II	2	3	3
		11	18	17

Sixth Quarter

BA 297	Internship	0	15	5
BA 296	Job Problem Seminar	3	0	3
RH 101	Economics	3	0	3
BA 121	Accounting I	4	0	4
*LA 104	General Biology III	3	3	4
		13	18	19

*Comparable courses at the University of Delaware or Delaware State College may be substituted.

The technician should be trained to perform any, some or all of the following duties depending upon needs of the local school district. At the completion of the Job Problems Seminar and Internship student will be able to perform:

1. Operation and maintenance of audio-visual equipment or assist A/V specialist if needed.
2. Under teacher direction creation of teaching aids.
3. Under teacher direction individualized pupil attention.
4. Clerical and recordkeeping tasks e.g., preparing letters and forms.
5. Supervision and maintenance of supplies and equipment.
6. Under teacher supervision assistance with small or large group demonstrations.
7. Helping teacher to relate abstract learning to practical needs and interest of students.
8. Preparation and assembly of equipment, supplies, chemicals, etc.
9. Inventories, purchasing, assistance with bid lists.
10. Housekeeping duties such as safety and storage.
11. Using laboratory techniques in biology, chemistry, physics, earth science.
12. Under teacher supervision assist with budget by investigating needs, replacements and expendables.

Below is a list of those who worked on the Science Education Technician Advisory Committee. The asterisk indicates those who worked on the curriculum subcommittee.

Members

Mr. Charles S. Parks, Principal
Greenwood Elementary School
Woodbridge School District

Mr. Larry Koppenhaver
Supervisor of Mathematics
Smyrna School District

Mr. Arthur W. Ellis
Curriculum Supervisor
Seaford School District

Mr. Willard Hickman
Director of Instruction
Milford School District

Mrs. Dorothy Taylor
Chairman of Science Department
Laurel Jr. and Sr. High School

Mr. William E. Griffin, Principal
Lake Forest East Elementary School
Lake Forest School District

Mr. Ralph Mahan, Supervisor
Mathematics, Science and Library Services
Indian River School District

Mr. James M. Proudfoot, Superintendent
Indian River School District

Mr. Edward Goate, Director
Secondary Education
Capital School District

Mr. Robert Martin, Director
Personnel and Secondary Education
Cape Henlopen School District

Mr. Claude Tisinger, Jr.
Secondary Science Supervisor
Caesar Rodney School District

*Miss Becky Bachman, Coordinator
Special Occupation
Delaware Technical and Community College, South

*Dean Ethel L. Lantis
Component Coordinator
DTCC, South

Non-Members

*Dr. Robert Uffelman
Component Coordinator
University of Delaware

*Dr. Thomas Ferguson
Delaware State College

*Dr. Ruth Williams
Delaware State College

*Mr. John Reiher
Department of Public Instruction

*Mr. James Gussett
Science Field Agent
DTCC, South

Armed with the knowledge that the Board of Education had no provision for the hiring of technician-level paraprofessionals in the public schools, extra effort was made and will continue to be made to educate teachers and administrators to the validity for using the technician not only to improve student learning but also to cut down on inventory costs. Teachers must be made aware of the fact that technicians release them for more professional and less routine duties. This kind of knowledge will continue to be shared in the future; however, this year's experience indicates a need to pursue flexible funding for another less threatening option to teachers.

4. Assessment of Success -

Progress was so smooth in this program that goals were reached well within the time limits set up. It became apparent as the year went on that the role of the Science Education Technician coordinator would need to change because of science staffing requirements at Del Tech, Southern Branch.

Evaluation of the Science Education Technician program is incomplete at best. Suffice to say that objectives were met of writing the curriculum and planning the program. Evidence that attitudes were changed in the planning may be given with the reaction to one of the advisory committee members who arrived at the first meeting standing firmly against the use of paraprofessionals and suggesting that NSF instead of spending money on an intern program should give her school money for some additional equipment. By the third meeting of the Committee, this same member had requested that a technician be supplied to her school with the expectation that she would work toward employing the technician after the two-year internship. All who have been planning this program believe that Del Tech, South, will have to sell the program once schools have been exposed to the technicians. Continued use will be made of the advisory committees not only for their expertise but also for their public relations value to the project.

One of the results of the efforts to encourage salary slots for Title XIV of the Delaware Code (which would provide salaries and funds for future science education technicians) is a new approach. It was discovered that inclusion of paraprofessionals in Title XIV salary schedules would cut down on the unit allotment of school districts, i.e. if a paraprofessional were hired a professional could not be hired. Because this system would force a choice between hiring professional and nonprofessionals, Delaware Technical and Community College, Southern Branch, is redirecting its efforts toward encouraging a six-year flexible funding, flexible staffing pilot project which is currently in operation in the Stanton School District.

Under this plan the district has the option of hiring professionals and paraprofessionals based on flexible use of Division I State funds. Teachers will not be threatened because districts will not be forced to choose between them and the technicians. As attrition occurs a teacher opening is replaced with two or more technicians.

After evaluation of the Science Education Technician staff, it was suggested that both the College and Del Mod could better utilize one individual in the role of coordinator-associate making optimum use of instructor time and relieving the heavy Field Agent burden.

Financial Summary

Science Education Technician

Total Amount Allocated, NSF -	$ 7,500.00
Total Amount Expended, NSF -	$ 6,200.00
Salaries - $6,000 Supplies - 200 $6,200	
Total Amount Expended, Delaware Technical and Community College -	$ 1,100.00
Amount Carried Over From NSF to FY '73 -	$ 1,300.00

Delaware Technical and Community College Component Coordinator -

In the role of the "nuts and bolts" enabler, the Component Coordinator has run the gamut from measuring window sashes to tracing down lost bus drivers. It has been a very fine learning experience to work closely with Field Agents and their activities as well as to meet with the Director and other Component Coordinators in implementation-planning sessions.

The Component Coordinator has observed a change in attitudes among the whole staff toward other components and agencies because the shared effort has produced friendly, helpful responses and a breaking down of chauvinistic interest to solve a problem. Participation in the Del Mod System has enabled the Coordinator to have increased exposure to Del Tech faculty as well as to in-State and out-of-State experts. The opportunity to explain technical education has given a different insight to numberous individuals. The positive, cooperative, enthusiastic efforts have paid off with increased us of facilities and personnel over the last six months.

The need to work with Del Tech, South, staff as well as members of the public schools and higher education institutions has brought new insights and changed attitudes toward fellow workers and the institutions because they have been seen in a different role. Working closely with the Science Education Technician curriculum committee and its coordinator has led to a change in the personnel structure in order to meet the needs of the System. An example of this is the creation of a new position which will assist the science education technicians and give even greater assistance to the Field Agent. First hand exposure to people, places and programs not only produced the recommendation for a new science education technician coordinator-field agent associate, but also for a full-time clerk-stenographer for the Resource Center in order that the people Del Mod, South, serves might receive improved assistance.

Because of the close working relationship with all members of the System, it has been possible to assess results quickly, feed back information rapidly, change course and resource allocation when necessary.

The Del Tech, South, Del Mod Advisory Committee has been very helpful in working with "outreach" ideas and providing ways and means to implement these ideas. The members are:

Mr. Gerald Bergstrom - DTCC Staff, Science
Representative Richard S. Cordrey - Sussex County
Mr. William Davis - DTCC Staff, Mathematics
Mr. James Gussett - Del Mod Field Agent, Kent and Sussex
Senator Thomas E. Hickman, Jr. - Sussex County
Dean Otis Jefferson - University of Delaware, Southern Branch
Dr. Charles McLaughlin - Superintendent, Milford School District
Mr. Paul Pippin - Student, Delaware Tech, South
Mr. John Reiher - State Supervisor, Science and Environmental Education, Department of Pubic Instruction (Del Mod Component Coordinator)
Mr. John S. Seney - Engineering Associate, Du Pont
Dr. Albert J. Strohmaier - Senior Research Enginneer, Du Pont
Mrs. Elsie Truitt - DTCC Board of Trustees
Dr. Robert Uffelman - Del Mod Component Coordinator, University of Delaware, Newark
Mr. James Wilson - Student, DTCC, South
Dean Ethel Lantis - DTCC Staff, Southern Branch, Del Mod Component Coordinator

Financial Summary

Component Coordinator

Total Amount Allocated - NSF	$ 11,900
Total Amount Expended -	$ 11,600

Salaries	$11,400
Supplies	200
Total	$11,600

Total Amount Expended by DTCC	$ 1,800
Amount Carried Over to FY '73	$ 300

STATE DEPARTMENT OF PUBLIC INSTRUCTION

STATE DEPARTMENT OF PUBLIC INSTRUCTION

The State Department of Public Instruction has assumed the responsibility of carrying out those inservice activities which do not fall within the purview of any other component. Assistance in organizing and carrying out the programs in the local districts was also rendered. Two hundred and seventy-nine records for inservice credit were processed and awarded.

The Research Division of the Department of Public Instruction cooperated with the Del Mod System in the administration of science achievement tests to fourth and eighth grade students. The Del Mod System administered tests to twelfth grade students. These results have been previously reported.

Through the office of the State Science Supervisor cooperation in purchasing films for the film library, coordination with ESEA Title I and ESEA Title III facilities have been achieved and interaction with the Career Education project has been accomplished.

Financial Report

Department of Public Instruction

Total Amount Allocated - NSF*		$ 9,088.00
Total Amount Expended -		$ 6,176.84
Salaries -	2,000.00	
Travel -	58.00	
Inservice Education -	1,000.00	
Supplies and Expense for Inservice Education -	2,910.20	
Conferences	208.64	
Total Amount Carried Forward to FY 73 -		$ 2,911.16

*This amount includes $1,088 from indirect costs

Del Mod Project No. 71-17

1. Project Name - Primary School Teachers - Science/Mathematics - K-3 - Marshallton-McKean Workshop

2. Project Director - John F. Reiher - State Supervisor, Science and Environmental Education
   William Geppert - State Supervisor, Mathematics

3. Component Assignment - State Department of Public Instruction - State Science Supervisor

4. District Involved - Marshallton-McKean

5. Participants - 30 - See Appendix for list.

6. Total Student Population Affected - 900

7. Objectives

   - To develop a science and mathematics education learning approach which is responsive to needs, abilities, strengths, and weaknesses of students in light of the open classroom concept.

   - To present materials for science and mathematics education that can be taught by primary teachers without special training.

   - To emphasize the combination role of mathematics and science.

   - To show design lessons so that apparatus is inexpensive and set-up time is small.

8. Target Population - K-3 Marshallton-McKean School District

9. Brief Account of Activities -

   Theme for Sessions (Eight)

   Emphasis was on the processes of analyzing, classifying, communicating, experimenting, interpreting, mathematical reasoning, measuring, observing, predicting.

   As requested by the Marshallton-McKean School District, one session focused on Elementary Science Study (ESS) and Science Curriculum Improvement Study (SCIS).

   Session 1-2: Emphasis on processes of analyzing, classifying, communicating

Session 3-4: Emphasis on processes of experimenting, interpreting, mathematical reasoning
Session 5-6: Emphasis on processes of measuring, observing, predicting
Session 7-8: Emphasis on integrating of the processes from preceding sessions.

The purpose of this program was not to implement a particular curriculum project or textbook series. The program centered about the philosophy of Jean Piaget' and the open classroom concept.

Time The program will be held in the afternoon from 3:00 p.m. to 5:00 p.m.

February 28	March 27
March 6	April 17
March 13	April 24
March 20	May 1

Place Marbrook Elementary School

Credit Inservice credit - 1 credit for those teachers who attend all sessions.

10. Assessment of Success

The teachers purchased equipment for classrooms for fall, 1972. Also, 18 signed up for follow-up program for week after school closed.

Attitude Survey was filled out by teachers to ascertain their thinking toward science activities.

Innovations at the primary level of science/mathematics provided the basis for district-wide program and adoption of K-6 program by the District Board of Education.

Financial Statement

Primary Science-Math Workshop
Kent County School Districts

Total Amount Allocated by Del Mod		$400.00*
Duplicating	$20.00	

* The materials used in this program were the same as those used in the Marshallton-McKean School District. The time of the participants and instructors was contributed.

Del Mod Project No. 71-11

1. Project Name - Primary Science Inservice - Ecology Project

2. Project Director - John F. Reiher - State Supervisor
   Science and Environmental Education

   Other Staff - Janet Johnson - Middle School Supervisor
   New Castle-Gunning Bedford District
   Robert Ney - Science Teacher
   New Castle-Gunning Bedford District
   Michael Broujos - Science Teacher
   New Castle-Gunning Bedford District
   Roger Daum - Title III, Environmental Lab,
   New Castle-Gunning Bedford District

3. Component Assignment - State Department of Public Instruction
   State Supervisor of Science & Environmental Education

4. District Involved - New Castle-Gunning Bedford

5. Participants - 24 - See Appendix for list.

6. Total Population Affected - 630 students

7. Objectives

   To prepare a group of primary school teachers, grades K-4, from the public and nonpublic schools of New Castle-Gunning Bedford, in areas of philosophy, teacher methodology, and the mathematical, biological, and physical sciences for the purpose of generating awareness among teachers and students for the ecological and career applications.

8. Target Population

   Participants: Thirty-two teachers at the primary level, K-4, in the focus school districts from:

   1. New Castle-Gunning Bedford School District
      A. Pilot or demonstration teachers from grades 1-3.
      B. Selected teachers of science from the primary grades 1-4.

   2. De La Warr and Appoquinimink School Districts - teachers of science, grades 1-4. (Did not continue after starting)

   3. Nonpublic schools within the focus districts - teachers of science, grades 1-4. (Did not continue after starting)

9. Brief Account of Proposed Activities

A. Series of meetings were held to familiarize the pilot or demonstration teachers with the materials and approaches of the equipment and material to be used for ecology awareness which were determined by local district implementor and master teachers along with state science supervisor. Implementation of demonstration or pilot classes were held during the week of October 25, 1971 by Mr. Daum at the Land Laboratory.

B. Inservice sessions - approximately 15-18 formal class hours.

a. Mini-sessions began at 3:00 p.m. and ended at 4:30 p.m. at Carrie Downie Elementary School in the All Purpose Room.

Wednesday, October 13, 1971
Wednesday, October 20, 1971
Wednesday, October 27, 1971
Wednesday, November 10, 1971
Wednesday, December 8, 1971
Wednesday, April 19, 1972

b. An awareness session was held at the ESEA III Land Laboratory Project on November 5, 1971 in conjunction with DSEA. These meetings served to acquaint primary teachers with the program and its approaches to ecology. (approximately 2 hours)

c. Maxi-session was held at 8:30 a.m. to 2:30 p.m. on February 7, 1972. Inservice day with five six-hour sessions for all thirty-two teachers were exposed to an indepth approach to the primary ecology approaches.

Materials Used

Materials used for this program were the ecology materials as developed by the Science Curriculum Improvement Study (S.C.I.S.) Project for use at the K-4 level.

10. Assessment of Success

A. Pre-post tests of teacher attitudes toward science education were administered.

B. A feedback report at end of each session of teachers was requested for formative evaluation for next session.

C. On-site evaluation of implementation by individual teachers was conducted by Mr. Daum and Mrs. Johnson.

D. A teacher proposed follow-up at the end of the inservice program. Reaction Form was given so that the 1972-73 program could be adjusted to individual teacher needs.

Financial Statement

Career/Ecology Program

Total Amount Allocated - Del Mod		$ 1,000
Total Amount Expended		$ 1,000
Salaries	$ 300	
Materials	700	
Total	$1,000	
Cost Per Participant		$ 42

Del Mod Project No. 71-18

1. Project Name - Junior High/Middle School Science Teachers Follow-Up Program on the 1970-71 Field Agent Program

2. Project Director - John F. Reiher, State Supervisor
   Science and Environmental Education

   Other Staff - Albert Burkhardt
   Bruce Watt

3. Component Assignment - State Department of Public Instruction, State Science Supervisor

4. Districts Involved - All districts in Kent and Sussex Counties

5. Participants - 48 - See Appendix for list.

6. Total Student Population Affected - 7,000

7. Objectives

   A. To provide in-classroom assistance to junior high school/middle school teachers.

   B. To follow up and reinforce the activities presented in the 1970-71 Field Agent program.

   C. To provide the opportunity for teachers to work on specific skills through micro-teaching.

8. Target Population - Junior high school and middle school teachers of Kent and Sussex Counties

9. Brief Account of Activities

   A. A dinner meeting was held at Geyer's Restaurant, February 23, 1972, Route 113, Milford, Delaware at 7:00 p.m. to explain the follow-up phase and to introduce the new Field Agent, Mr. Al Burkhardt.

   B. Mr. Burkhardt made visitations to classrooms at a prearranged date to assist with current problems. He met with each person individually during the planning period and with other teachers as a group after school. Each teacher was visited at least once and in some cases, if time permitted, a second visit was made.

   C. One video-taping session was scheduled for each teacher to assist in improving teaching techniques. Mr. Bruce Watt assisted in the video-taping.

Video-tape schedule

Date	School	Number of Tapes
Monday, April 17	Smyrna Middle School	(1)
Tuesday, April 18		
Wednesday, April 19	Dover Central Middle	(12)
Thursday, April 20		
Friday, April 21	William Henry Middle	(4)
Monday, April 24	Dover A. F. Base High	(3)
Tuesday, April 25	W. T. Chipman Jr. School	(2)
Wednesday, April 26	Seaford Jr. High	(2)
Thursday, April 27	Woodbridge Jr. High	(3)
Friday, April 28	Delmar School	(2)
Monday, May 1	Milford Middle	(4)
Tuesday, May 2	Sussex Central Jr. High	(3)
Wednesday, May 3	Selbyville Middle	(3)
Tuesday, May 9	Milton Jr. High	(2)
Wednesday, May 10	Caesar Rodney Jr. High	(5)

D. A weekend conference at Cape Henlopen State Park was held in mid-May. This enabled teachers to participate in outdoor experiences in this multi-faceted environment and discuss with their colleagues mutual interests. The park is open to student groups and with the help of a teacher-naturalist, teachers may learn how to fully use this resource. Due to a two-day Northeast storm only 15 of the 33 who had indicated they would attend were present.

Friday, May 19, 1972

7:00 a.m.	Registration
7:30 a.m.	Alligator Walk
	Classroom Communication - John Reiher
9:00 a.m.	Ghost Crab Hunt - Dr. Maura Geens

Saturday, May 20, 1972

7:00 a.m.	Breakfast
8:00 a.m.	Sand Dune Adventure
10:00 a.m.	Paraphrasing/Behavioral Descriptions - John Reiher
	Lunch
1:00 p.m.	Beachcombers Adventure - Dr. Geens
3:00 p.m.	Describing Feelings - Non-verbal Communication - John Reiher
5:00 p.m.	Adventures Challenged
	Dinner
9:00 p.m.	Environmental Mood
8:00 p.m.	Independent Adventure

Sunday, May 21, 1972

7:00 a.m.	Concept of Feedback
8:00 a.m.	Water Works Field Trip - Dr. Geens
	Wrap-up

10. Assessment of Success

The video-tapes made by Mr. Bruce Watt are in the process of being coded for comparison with those made in 1970-71. These two tapes will be shown to the teachers during 1972-73 year.

Mr. Al Burkhardt filed monthly reports with the Director.

Five teachers from the 1970-71 program have progressed to the point of inclusion in the Leadership Training Program at the University of Delaware. The modules prepared by these teachers have been field-tested in their schools and all except one have carried out or assisted with local school inservice programs.

Every teacher, except two, who participated during 1970-71 voluntarily agreed to participate in 1971-72 although programs were held on time outside of school hours. It has also been interesting to note that frequent visitors to the Resource Center were participants from this program.

Financial Statement

Junior High/Middle School Science
Teachers Follow-Up Program

Total Amount Allocated by Del Mod		$ 2,500.00
Amount Expended		$ 2,481.99
Field Agent Services	$ 2,000.00	
Cape Henlopen Weekend Field Trip	60.64	
Dinner Meeting	148.00	
Video Tapes	152.30	
Duplicating	21.09	
	$ 2,481.99	
Cost Per Participant		$ 52.00

Del Mod Project No. 71-9

1. Project Name - Primary School Teachers - Science/Mathematics Workshop

2. Project Director - John F. Reiher - State Supervisor
   Science and Environmental Education
   William Geppert - State Supervisor
   Mathematics
   Other Staff - Mrs. Patricia McBath - State Supervisor
   Early Childhood Education

3. Component Assignment - State Department of Public Instruction - State Science Supervisor

4. Districts Involved - Kent County School Districts

5. Participants - 32 - See Appendix for list.

6. Total Student Population Affected - 990 (33 participants x 30 average class size)

7. Objectives

   A. To develop a science education learning approach which is responsive to needs, abilities, strengths and weaknesses of students in light of the open classroom concept.

   B. To present materials for science education that can be taught by primary teachers without special training.

   C. To show design lessons so that apparatus is inexpensive and set-up time is small.

8. Target Population - Teachers at K-3 level and/or administrators at that level.

9. Brief Account of Proposed Activities

   The purpose of this program was not to implement a particular curriculum project or textbook series. The program centered about the philosophy of Jean Piaget' and the open classroom concept.

   Theme for Each Session

   Session 1 - (10-6-71) Emphasis on processes of analyzing, classifying, communicating.
   Session 2 - (10-13-71) Emphasis on processes of experimenting, interpreting, mathematical reasoning.
   Session 3 - (10-20-71) Emphasis on processes of measuring, observing, predicting.
   Session 4 - (10-27-71) Emphasis on integrating of the processes from preceding sessions.

Timetables of Activities

Four two-hour sessions were held on Monday afternoons, October 6, 13, 20, and 27 from 3:00 p.m. to 5:00 p.m. at East Dover Elementary School.

Each participant received one inservice credit.

10. Assessment of Success

Because of the instructional level of teachers, there was no appropriate pre/post test instrument available.

A written evaluation was requested of participants (Copy of form in Appendix).

I - Pace: 22 felt it was very good, with general comment "Relaxed and geared to all types of teachers. Those working with children and those supervising."

II - Active Involvement: 26 thought very good, with general comment "Group is always actively involved and keeps our interest."

III - Instructional Rapport: 24 felt it was excellent, with general comment "Clear, concise, friendly and interesting."

IV - Your interest met: 29 yes responses with comments like "As a reading person, I was anxious to investigate math and science areas for young children."

Financial Summary

Primary Math/Science Project

Marshallton-McKean

Total Amount Allocated by Del Mod	$ 400.00
* Amount Expended	
Supplies	$ 400.00
Duplicating	
Cost Per Participant	$ 12.00

* Services of the instructors were contributed by Department of Public Instruction.

UNIVERSITY OF DELAWARE

UNIVERSITY OF DELAWARE

The faculty and staff concerned with science and mathematics education held meetings and discussions to determine how the group could facilitate the Delaware Model: A Systems Approach (Del Mod System).

Resources exist at University of Delaware in the faculty and in the departmental facilities of all the colleges. The College of Arts and Sciences and the College of Education were selected to implement the Del Mod System. Supervision of the University Component is assigned to a Coordinator, who, in turn, is responsibl to the Associate Dean, College of Education. The Coordinator supervises, coordinates and evaluates the component projects. He is assisted in this task by an advisory committee whose members were selected from the mathematics and science departments in the College of Arts and Sciences and from the mathematics and science education facilities in the College of Education. The Dean, College of Graduate Studies, is chairman of this committee. Thus, coordination with existing University programs is facilitated, and projects which coincide with goals and priorities of each department and faculty member are encouraged. Activities that do not meet the needs identified by the Del Mod System are also encouraged when they meet departmental and University priorities, and resources are sought for their support.

The faculty of the Del Mod component consists of the science, mathematics, science related and education faculty concerned with advancing science education for the pre-college students and their teachers. They plan, develop, teach, and evaluate innovative courses and materials for school teachers who adopt those materials that meet the needs of their students.

The major accomplishment of the University component is the selection of those needs consistent with the University goals and priorities that could be met by the available resources and the re-direction or reinforcement of projects to meet these needs. Clearer operational definitions are being constructed for some of the identified needs. For example, to define "change of teaching strategy," the highest priority need for junior high/middle schools, requires identification of aims and objectives held by school personnel and new curriculum projects before a re-education program could be operationalized with the specificity required for adequate assessment of its effectiveness with teachers and their students. Formative evaluations are being conducted for planning-revision of the operational definition process, classroom practices, and development of individualized teacher education modules for both pre-service and re-training programs.

Financial Summary

University of Delaware

Total Amount Allocated - NSF		$ 166,058
Total Amount Allocated - Du Pont		$ 50,100
Component Coordinator	$14,750	
Madison Project Elementary Mathematics Program	$ 2,000	
Physical Science Inservice Project	$12,100	
Physical Science 1971 Summer Project	$29,299	
Marine Environment Curriculum Study	$32,499	
Population-Environment Curriculum Study	$48,285	
Leadership Training	$37,400	
Science Resource Center	$39,825	
Total Amount Expended		$155,018
Component Coordinator	$14,750	
Madison Project Elementary Mathematics Program	$ 1,900	
Physical Science Inservice Project	$12,050	
Physical Science 1971 Summer Project	$24,191	
Marine Environment Curriculum Study	$19,050	
Population-Environment Curriculum Study	$27,100	
Leadership Training	$19,410	
Science Resource Center	$36,567	
Total Amount Carried Over To FY 73		$ 61,140

University of Delaware Component Coordinator -

During the year, the major task of the coordinator was to implement, supervise and evaluate the University of Delaware component of the Del Mod System. This task involved originating and coordinating programs for the improvement of science teaching. These activities required development of an organizational plan, a coordinator's office and a Resource Center.

The Science Education Center in the College of Education was enlarged to provide the needed physical facilities. A Science Education Advisory Council consisting of the Deans, Colleges of Graduate Studies, Education, and Arts and Sciences, departmental chairmen, and representatives of mathematics and science education facilities was created. Dr. Arnold L. Lippert, Dean, College of Graduate Studies served as chairman. The component coordinator is assigned to the Dean, College of Education for coordination of Del Mod activities with other teacher education programs.

The Advisory Council met monthly throughout the academic year to advise the coordinator and to facilitate communication with the science and mathematics departments. These meetings resulted in a coordinated program designed to insure a co-equal partnership between science and education and developed a better understanding of science and the educative process. This multi-disciplinary program prepared both pre and inservice teachers, and provided special training in those areas where needs were identified. A major accomplishment of the Advisory Council was the selection of projects for 1972-73 that held promise of meeting the needs in science and mathematics education consistent with the University goals and priorities. This activity required identification of additional resources within the University and the re-direction of existing projects. As a result, the proposed projects for 1972-73 more nearly meet the needs of schools in Delaware.

Development of the Science Resource Center and coordination of Del Mod projects with University teacher education programs required most of the coordinator's time and efforts. The initial collection of textbooks and curriculum materials was enlarged to serve the initial target population. Before the Resource Center was operating at full schedule, it became apparent that more space, materials and staff would be required.

The coordinator also served as Chairman of the College Assessment Committee. In this latter capacity, he worked with other faculty members to revise the undergraduate teacher education programs and the graduate degree programs. Empirical data from Del Mod projects and college programs provided useful information for both sets of tasks. For example, the College of Education Self Instructional Audio-Visual Equipment Laboratory provided a model for modularizing instructional units in Del Mod projects and gave impetus to expanding the Resource Center with self-instructional teacher orientation materials. Attached are user comments from the Audio-Visual Equipment Laboratory. Success with the Field Agent activities resulted in expanding non-credit symposia offerings. The need for constant assessment of systems activities resulted in publication of two monographs: Developing and Evaluating the Del Mod System and Getting Involved in Del Mod Activities.

AUDIO-VISUAL EQUIPMENT LABORATORY EVALUATION

SUMMARY

1971-2 USER'S COMMENTS

1. What do you like best about the laboratory?

The friendly atmosphere, and friendly assistance and instruction.

I like the idea of you working at your own speed and being tested when you are ready. Also you get to operate the machines yourself.

I like the idea of proceeding at your own pace, not having an assistant at your back.

I liked being able to handle the equipment myself, without just having instructions presented or given to me.

It lets you work at your own speed in order to make sure of getting the procedures correct.

Everything was well ordered, and evidence that is was very well constructed is clear.

Programmed type instruction is excellent, very easy to follow. Staff every cooperative and helpful.

It was a good way to get some hands on experience without having to wait until you're in front of a class to try to learn.

Programmed instruction facilitates more thorough learning of A-V equipment. Personnel friendly and very helpful. Rarely crowded. Provided opportunity to learn a number of A-V aids I might not have run across i.e. video recorder.

Working at my own speed, whether fast or slow and making sure I know how to use the equipment.

I like best the fact that the A-V instructors are always so pleasant and helpful (even to people as unmechanical and clumsy as me!). . .

Self-instruction aspect. Since I was unfamiliar with the equipment, it helped to work at my own speed.

I liked working with the machines and the proctor was very helpful - (the tutorial slides-allowed you to go at your own rate).

I think it is good for it gave you a chance to run the different audio visual equipment, and learn how to use them properly. To me this will be a great aid as I go into teaching.

I like the laboratory as a whole, because it gives me a great opportunity to learn how to use such media, that I will be teaching in the future. There was no one aspect I could point out, but just having the opportunity I mentioned.

I liked the equipment. It was the type equipment we would use in everyday teaching. The location is nice because it is easy to get to between classes and the hours are good.

That it gives you a chance to learn how to work and operate the equipment on your own. It gives you a good guide thru the operations of the machines.

Many of the projectors are very valuable to learn to operate. Also the self instruction is good in that the instructor will help correct ; our mistakes and helps you learn much more.

The equipment we learned. I feel will be very useful in future teaching.

There is not an over amount of pressure when you are using equipment. Self-tutorial is excellent technique for learning.

The fact that I could do the work on my free time.

I like the self-instruction and separate booths. There is no stress on time limit.

Being able to get some experience on the equipment available.

I liked being able to work at my own speed, so as to be tested when I felt I was ready, and not feeling like I was rushed to get done.

The fact that you can learn individually at your own speed.

Viewlex.

Chance to handle and use the machines at my own speed-which is slow. Good variety of machines.

The variety of equipment provided and the help given during the learning session.

The instructors were very helpful to help me learn all that I needed to know about each instrument.

You can work at your own pace.

You are able to go at your own speed and experience every facet of operation.

The opportunity to actually use the equipment.

Could work at own rate. Got to work all machines by self.

I feel that it gives you the opportunity to see what is available in schools - how to work the machines, etc. In this way I feel I will now be able to use them much better when teaching.

Relaxon atmospons conveyor on the part of the staff.

I learned to work projectors, which I did not know.

Knowing how to work movie projectors (and slide projectors) so I can do it by myself at home.

I think the lab is well set-up. Instructions are explicit and proctors were helpful.

I liked the fact that you went at your own rate of speed. I am really glad that I learned how to operate the B & H Projector the others I think (probably with alot of fumbling) could be figured out by themselves if it was necessary.

I like the self-instruction equipment where you can work at your own speed. Also the instructors are very helpful.

The possibility to teach yourself with assistance if you need it, and the variety of equipment available for instruction.

Everybody was very helpful and I did learn how to use some of the equipment that I didn't know before.

Being able to operate the equipment myself. A guide to explain.

Self-instruction aspect -- progressing at own rate.

The fact that the slides let you go at your own rate.

Ease with which slides let you go at your own rate.

I like the opportunity to be embarrassed here and learn now, rather than blowing it in the classroom. All in all, very well conducted.

I liked learning how to work Bell & Howell and tape recorder.

Self-teaching.

The technician's a good guy.

The Carousel instructions were excellent, the people aiding were also excellent.

Learning how to use all the equipment.

The opportunity to learn to operate the equipment at your own rate of speed.

The fact that I can go through it individually. The helpfulness of instructors.

The fact that I'm finished! I always wanted to know how to run a movie projector. Now I won't have to be afraid to show movies etc. all the time. 'cause I'll know how to use everything.

It gives you a one to one relationship. You get great experience before you go to the classroom.

Can learn at your own pace. Can work directly with the equipment and familiarize yourself with the machines before using them in the classroom. Always someone there to answer your questions.

It's great - learned a lot in a minimum amount of time and it's fun !

The instructors are very helpful and congenial.

You can practice on the equipment as long as you want. People help you clarify items that are not clear on slides.

The service is good. The instructors are helpful. The audio-visual instruction is clear and easily understandable.

Whenever I came the Lab only had a few people and so the instructor could answer questions. Many times she patiently explained things that I was confused about.

Learn to use equipment that will be needed in teaching.

It's a relief to be done. Every teacher should know this stuff.

(1) the self-pacing that is possible through the use of the Carousel projectors. (2) The slides in the Carousel projectors which instruct us (on how to operate the machines) move in a series of small related steps. The steps cover only 1 aspect of the machine operations (or maybe 2)

The opportunity to actually use the equipment.

It's a great place to learn about A-V equipment. Gives the prospective teacher a chance to practice necessary things.

I think the programmed instruction using the carousel is great! The instructors were very helpful.

You can run through the equipment at your own speed and there is someone around to answer questions.

The aids are very helpful and patient and the instructions were very well done and easily understood.

The number of the kinds of equipment and the self-tutorial aspect.

Materials and helpful instruction.

Meetings of new people. I like to learn the equipment once I do it but it's a pain in the neck to have to come up here and take the time to do it especially when I have units and lesson plans!

Finally being able to work all movie projectors.

The operator - very helpful woman. The variety- good exposur .

The self-teaching technique used.

There is a person working who is willing to help you with problems. It also has modern equipment.

Being able to practice on the equipment on our own rather than just being shown how to use things.

The fact that all kinds of machines are there and the personnel assistance when one gets stuck.

2. How could the laboratory serve you better?

I can't think of any way it could possibly be any better.

I realize that there is a shortage of aids in running this laboratory, but more times available to practice would be a help. At times, the lab got so crowded and hot, it was difficult to be patient to wait for one's turn.

If this thing wasn't required for ED410 I could go through like a breeze. But with me lab instruction, I don't have time to sit around and wait to be checked off. I am too busy to waste this time.

The lab could be open a little more hours to avoid crowding There could be some added information for extra things that could be done with each of the equipment, rather than just learning to operate them.

The laboratory is very helpful now!

More equipment.

1. By having duplicate equipment so more than one person can learn the same thing without waiting in line.
2. By having more than one person helping and testing when it's crowded.
3. By being open Monday through Friday in mornings and afternoon(This would also help create more jobs, yes?)

Being open at a more convenient time -- earlier. Also it should be enlarged to facilitate more people.

Better hours, bigger room, Slides could tell us why we do some of these things. Very little cause and effect explanation.

By having more people to supervise and check so that you may move from one station to the next more quickly.

I think a bigger room with possibly another person working would be better. I dislike people being so close to me while I am working.

Put a reasonable time limit on how long one person can occupy a particular piece of equipment at one time -- sometimes somebody will spend a hour or more on one item--which causes a long wait for others.

Looks fine to me the way it is.

It's ok as it is.

It can't. It is good now.

I think the set-up is fine!

Sometimes I felt the instructions on the film could be a little 'etter. Also, there should be a sign telling everyone to put equipment back as if it were being used for the first time.

My only complaint is that the instructional slides were unclear at times.

No other way right now.

I think if we were able to use some of this equipment in class or in our classrooms, it would give us more practice. I think I might have forgotten how to use some of the equipment.

It would be nice to be able to come in at any time and work some of the equipment again, especially if you needed to refresh your memory on any of the equipment.

If there were more evening hours.

It could'nt

I'd like to try a video-tape machine sometime. It has been fine as long as I came in when there were'nt crowds of people. Good instruction.

Have more instructors to meet the needs of each student.

It couldn't serve me better. You should have the whole semester to complete this time rather than one month period for example.

It could be open more.

The use of TV portable equipment should be available.

I think it's very good now.

By being open evenings and weekends.

More hours.

Nicer personnel!!! And more of them. Limit the amount of people who come into here at one time so we don't have to waste half the time waiting.

It is well organized.

Put lab in larger room. It gets very crowded. Have more than one instructor so they do not have to keep a frantic pace and yet can answer your questions quickly.

I can think of no answer to this question. I thought the laboratory on the whole was great.

It would be better if there was audio-visual instruction as well but I realize it may be impractical.

Serves me perfectly, instructor helpful.

Be open more hours.

I don't have any suggestions. It was excellent.

Maybe small instructional booklets (Illus.) would be helpful for future reference. -- They would be handy since forgetting is bound to occur.

It served me with 100% efficiency just the way it was set up.

It could serve me better if there were duplicates of the equipment many times when I came I had to wait or else leave because the room was so crowded.

I thought the whole procedure was fine.

If the laboratory had more stations, it might eliminate some waiting on busy days.

I think the laboratory is doing a great job right now and it would be hard to improve on it.

The only improvement that I can suggest, is more space, that is another room with similar equipment. There were a few days when I didn't get anything done becuase it was crowded. This the only suggestion I have, because everything else seemed to work well, I really will benefit from this experience.

Maybe add more equipment or different makes of the equipment you already have. A larger room would be better also.

Maybe by having more equipment and a way of testing quicker when it is crowded.

If it was open more hours so I could come in and review in case I should need to use these projectors it would be a great help.

Perhaps the directions could be a little clearer. And you need more space.

No suggestions--Except to be open Saturday and evenings too!!

I see no need for any changes.

If you have slides or a film that you personally want to see you could use the equipment.

The lab would be a good brush-up for in-service teachers. As for me, it gave me experience with equipment I'd never seen, nor used.

Be open more.

More personnel.

Increase the amount of time that the Lab is open. Rotate the time that various classes use the lab. It is rediculous that both Ed 410 and Ed 371 (a total of approximately 350 students) are required to go through the lab. This might cut down on the terrible crowded and mobbed lab.

If there were more regulation or more people to check during the times when it is crowded. A few times people have had to wait all afternoon to use a particular piece of equipment.

Many more machines, more hours.

The hours were quite insufficient for learning and testing on the instruments. Also, the small room and one piece of equipment for each table hindered many people from doing their best.

It is an efficient operation with very little improvement necessary in the technical aspects.

It was quite sufficient.

I would have liked it to be open in the morning at least one day a week. But besides that it was fine.

If the facilities were enlarged to allow 2 of each piece of equipment, it would ease up the traffic jams that occasionally occured. Also, if the lab were open more hours per week, it would alleviate the situation somewhat. I question how long the abilities acquired here will be retained after only using the equipment once or twice.

As of now, the laboratory serves me very well.

I was served quite well and have no complaints.

More hours during regular school days.

Have a period in the morning to use lab.

By having us use it freshman year.

More people to check at peak times.

Served me well enough.

Get more assistants to aid the large number of students required to learn the equipment.

More assistants or faster testing. Overall very useful.

Financial Statement

Component Coordinator

Total Amount Allocated - NSF		$14,750
Total Amount Expended		$14,750
Salaries	$14,196	
Supplies & Expenses	254	
Travel	300	
Total	$14,750	

Del Mod Project No. 71-16

1. Project Name - Madison Project Elementary Mathematics Program

2. Project Director - John A. Brown

   Other Staff - Verena Sharkey
   Charles Eisenbise

3. Component Assignment - University of Delaware

4. Districts Involved - Mount Pleasant
   Claymont
   Capital
   Appoquinimink
   Laurel
   Milford

5. Participants - 38 - See Appendix for listing

6. Total Student Population - 1,050

7. Objectives -

   To develop a workable knowledge of activity-centered mathematics classes through experience with classroom material and activities developed by Madison Math Project and similar groups.

8. Target Population - Experienced middle or elementary school classroom teachers.

9. Time Per Participant - Fall-15 weeks - 3 hrs per week (1 group)
   Spring-15 weeks - 3 hrs per week (2 groups)

10. Activities -

    Workshop participants studied and explored in depth the following materials:

    a. Cuisenaire rods and geoboards
    b. Attribute blocks and related material
    c. Multibase blocks
    d. Madison project shoebox activities
    e. Scales, balances, slide rules and various devices for measurement
    f. Tangrams and tangramath
    g. Material from the following provided laboratory experiences:
       (1) Peas and Particles
       (2) Laboratory Manual for Elementary Mathematics by Fitzgerald et al

    (3) Modern Elementary Mathematics: A Laboratory Approach by Callahan et al
    (4) Explorations in Mathematics by Davis
h. Commercially prepared activity cards and games

They worked in small groups and set up mathematics experiments and activity centers. Each prepared a series of activity cards to be used in his own mathematics class. Several films related to the subject were viewed and discussed. They also discussed classroom implementation of their new ideas and equipment, such as individualization, grouping for activities, record keeping and evaluation.

The workshop was in the planning stage throughout the spring and summer of 1971. The first workshop was held in Claymont from September through December, 1971, with 15 participants. Charles Eisenbise was the teacher and Verena Sharkey acted as coordinator for the University of Delaware. During the spring of 1972 two workshops were held--one in Claymont, Mr. Eisenbise teaching, and one in Dover with Verena Sharkey teaching. Participants in these workshops were from several school districts.

A sample of the classroom materials has been housed in the Resource Centers for use by all schools and by pre-service classes. The State Mathematics Supervisor, Mr. Geppert, and a local school district supervisor assisted with the instruction. They will use the materials in their future inservice teacher training activities.

11. Assessment of Success

At the conclusion of each workshop, a subjective test determined participants' knowledge of laboratory material used during the course. All participants showed greater understanding of the fusion of mathematics and science activities.

Those who participated in the September 1972 workshop were observed. It was determined that a definite change transpired in their approach to mathematics in the classroom.

12. Commitment from Other Sources

Classroom space for workshops was provided by the local schools. Classroom materials were purchased from school districts by participating teachers.

Financial Statement

Madison Project Mathematics

Total Amount Allocated - NSF		$ 2,000
Total Amount Expended		$ 1,900
Salaries	$ 850	
Travel	100	
Supplies & Expenses	950	
Total	$1,900	
Amount Carried Over to FY 73		$ 100
Cost Per Participant		$ 50

Del Mod Project No. 71-15

1. Project Name - Physical Science Inservice Project

2. Project Director - S. Yolles

3. Component Assignment - University of Delaware

4. Districts Involved - New Castle County Schools

5. Number of Participants - 31 - See Appendix for Listing.

6. Total Student Population - 3,600

7. Objectives -

   To improve the teaching of physical science in junior high and middle schools without adversely affecting the existing programs in the high schools.

   To reverse the escalating anti-science attitude that has emerged in society in recent years.

   To upgrade the general level of science education for all students in secondary schools.

   To provide a cadre of terminal high school students who have taken a modern science course from a well-prepared teacher.

8. Target Population - Teachers of physical science in secondary schools.

9. Time Per Participant - Equivalent to 2 four-semester hour courses (4 hours per week for 30 weeks).

10. Activities -

    Students elected one course each semester from the following list or from regular departmental courses according to their own specific needs and background:

C-5185	Physical Chemistry for Teachers of Science
C-5205	Organic Chemistry for Teachers
C-5415	Basic Concepts of Chemistry
C-866	Special Topics in Chemistry
ED 660	Educational Measurements
ED 807	Educational Research Procedures

In addition, all participants met together for ED 505 Teaching Modern Science to design secondary school laboratory activities and to become familiar with recent developments in secondary school science programs. Participant presentations were videotaped for their own review and critique.

11. Assessment of Success

Informal feedback about science courses were sought during the ED 505 Seminar sessions. Participants responded that the courses were valuable and contributed to their teaching. They also discovered personal academic weaknesses that needed further strengthening.

A limited number of visits to participants' classrooms were made by this project staff and by Del Mod staff. The results are encouraging, but broader participation is needed to prevent loss of interest by the well-prepared teachers who were not eligible for these activities.

The Physical Science Project has led to coordination of science teacher preparation in Geology, Physics and Chemistry Departments. The professional organization of scientists and teachers and the local chemistry oriented industries are working together to plan teacher education, to discuss high school course changes and to develop employment opportunities for students in industry. These specially designed courses are offered for biology teachers to supplement their understanding of physical sciences. The State Department of Public Instruction works closely with this project to improve instruction throughout the state.

Schools are providing more materials to their teachers of physical science. The College of Education is proposing a General Science Education laboratory-classroom to provide more emphasis to the physical sciences.

Financial Statement

Physical Science Inservice Project

Total Amount Allocated - NSF		$12,100
Total Amount Expended		$12,050
Participant Support	$ 2,850	
Salaries	8,800	
Travel	50	
Supplies & Expenses	350	
Total	$12,050	
Amount Carried Over to FY 73		$ 50
Cost Per Participant		$ 388

Del Mod Project No. 71-1

1. Project Name - Physical Science 1971 Summer Project

2. Project Director - S. Yolles

3. Component Assignment - University of Delaware

4. Districts Involved - 11

5. Number of Participants - 30 See Appendix for listing.

6. Total Student Population - 2,250 (estimate)

7. Objectives

   To improve the teaching of physical science in junior high and middle schools without adversely affecting existing programs aimed at the high schools.

   To reverse the escalating anti-science attitude that has emerged in society in recent years.

   To upgrade the general level of science education for all students in secondary schools.

   To provide a cadre of terminal high school students who have completed a modern science course from a well-prepared teacher.

8. Target Population - Teachers of physical science in secondary schools.

9. Time Per Participant - Each attended 6 hours per week for 6 weeks.

10. Activities

    Participants attend two of these courses:

    C 542 Basic Concepts in Chemistry I to improve their understanding of general chemistry.

    C 666 Chemical calculations to learn mathematics strategies for high school students.

    PS 560 Basic concepts in physics to add to their own knowledge of the principles of physics.

    Courses met daily for five weeks for the equivalent of 3 semester hours. The sixth week included evaluation of the participants and these special courses.

Plans for the 1971-72 inservice courses were reviewed, appropriate revisions were suggested and new courses added.

11. Assessment of Success

Students gained in knowledge of basic chemistry, physics and chemical calculations. Participants recommended follow-up activities that would be helpful to them and that the program should be repeated for other participants.

The science backgrounds of entering freshmen at the University is noticeably improved after three years of this project. Materials, ideas and activities introduced through this project can be found in the schools as a direct result of our efforts. More teachers appear better prepared in science.

Local districts are offering different physical science courses and programs as a contribution to improvement of physical science teaching. The local section of the American Chemical Society provides assistance to schools and teachers to promote this activity. University facilities were altered to provide a better teaching situation.

Financial Statement

Physical Science Summer Institute

Total Amount Allocated - NSF		$ 29,299
Total Amount Expended		$ 24,191
Participant Support	14,092	
Salaries	9,549	
Supplies & Expenses	550	
	24,191	
Total Amount Carried Over To FY 73		$ 5,108
Total Cost Per Participant		$ 728

Del Mod Project 71-3 and 71-6

1. Project Name - Marine Environment Curriculum Study

2. Project Director - James P. Schweitzer, Summer 1971
   Robert W. Stegner, 1971-72

   Other Staff - Maura Geens

3. Component Assignment - University of Delaware

4. Districts Involved - 17

5. Participants - 47 See Appendix for participants.

6. Total Student Population - 2500

7. Objectives

   A. To establish a multi-disciplinary, K-12 program of marine and wetlands environmental studies appropriate to the state's needs.
   B. To train a cadre of teachers to introduce marine science topics into existing school programs

8. Target Populations - K-12 teachers of science or social studies

9. Time Per Participant - Summer: 4 hours per day for six weeks
   Inservice: 30 - 2 1/2 hour sessions

10. Activities

During summer 1971, a workshop of eighteen teachers prepared teaching resource packets in environmental studies under the direction of Dr. James Schweitzer. These materials were designed as part of a multi-disciplinary, K-12 program of marine environment studies. Eighteen packets were produced.

During the fall and spring semester of 1971 and 1972, Dr. Maura Geens offered a course in marine environment studies for teachers in Milford. Twenty-eight were enrolled in the fall and nineteen in the spring. Thirty-nine teaching resource packets were produced.

The teaching resource packets included some detailed lesson plans of the conventional type, listing materials needed, objectives, specific assignment, questions, etc. There are also packets of materials more accurately described as general background material for the teacher, and there are some packets which could be considered resource collections and general plans for extended units or chapter studies. In a few cases the materials are articles or clippings of special interest as a possible basis for planning educative experiences.

In most cases the materials are in developmental condition and may require editing, evaluation, documentation, enrichment, and refinement.

The materials are classified in accord with the Conceptual Scheme for Population-Environment Studies, Population Curriculum Study, University of Delaware, Experimental Edition, 1972. Each packet is identified with a certain concept or subconcept of the scheme but sometimes the classification is arbitrary and a packet of materials may encompass several conceptual areas. Cross references to reflect this diversity are incomplete.

The system of notation in the inventory includes these headings:

Concept Number	Suggested Grade Level	# of Class Periods	Suggested Subject Areas(s)	Type of Material	Initials of Writer	Title of Lesson
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7

Note 1. The symbol for each concept or subconcept is composed of the outline headings of the Conceptual Scheme for Population-Environment Education, 1972.

Note 2. Suggested grade level is indicated generally but will vary greatly depending on local courses of study and student abilities. Modifications to fit specific grade levels are left to the professional judgment of teachers.

Note 3. Number of class periods will depend on scheduling and on the degree of expansion of a topic desired. The time schedule is often listed as Various.

Note 4. Suggested subject areas are a general guide only and may be misleading. Attention is directed to the concept and to the title of the material.

Note 5. Type of Material:

Background Reading

Those teaching resource packets designated "B" in the Inventory are primarily background reading selections for use as the teacher prefers. NOTE; Most resource packets contain some background material even though they are not designated "B".

Laboratory Investigations

Those teaching resource packets designated "L" consist of activities normally associated with the manipulation of equipment and materials in the processes of science.

Field Studies

Those teaching resource packets designated "F" consist of activities outside the classroom, including extensive scientific field studies and observational field trips.

Classroom Activities

Those teaching resource packets designated "C" consist of activities such as recitations, written exercises , and quizzes.

Inquiries

Those teaching resource packets designated "I" consist of activities involving the student in the collection and interpretation of evidence.

Note 6. Initials of writers indicate the principal authors in most cases. Sometimes materials were prepared by groups.

Note 7. Specific title of lesson is intended to describe the material more precisely than the concept number.

The completion of the lesson evaluation form is intended to help in the revision of the materials as they succeed.

THE MARINE ENVIRONMENT CURRICULUM STUDY
University of Delaware

Fall 1972

INVENTORY OF TEACHING RESOURCE PACKETS FOR MARINE ENVIRONMENT STUDIES

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
I.A.	7-9	Various	Science, English	C,L	RKM MEL	Continental Drift
I.A.	7-9	5	Science	C	WER	Introduction to Oceanography
I.A.	7-9	Various	Science	L,C	Unknown	Marine Environment Unit
I.A.	7-9	2-5	Science	C	PFC	Underwater Sound Transmission
I.A.	10-12	Various	Biology, Chemistry	C	MLS	The Physical Properties of Water
I.A.	7-9	Various	Earth Science, Life Science	C,F,L	MG	Instruments Used to Study Marine Environments
I.A.	7-9	Various	Earth Science	L,C	FG	Oceanographic Methods and Instruments
I.B.1.a.(3)	7-9	6	Science	C,L	SJN	Minerals in Seawater
I.B.1.a.(3)	8-9	6	Science	C,L	NER	Freshwater from Seawater, The Process of Desalination
I.B.1.a.(3)	7-8	5	Science	L	RDR	Surface Tension

*See Note 5 of Introduction.
**See list of contributors attached.

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
I.B.1.a.(3)	7-10	1-2	Science	C,L	RDR	Water Density
I.B.2.a.& b.	7-10	Various	Life Science, Biology	L,C	DRS	Air and Life
I.B.2.a.& b.	7-12	Various	Life Science	L	RWS	Some Observations of Life in a Pond (Aquarium)
I.B.2.b.(2)	10	1	Biology	L	FCB	Temperature Increase and Oxygen Consumption of Aquatic Animals
I.B.3.	3-4	Various	Science	F,C	BHS	Exploring a Pond
I.B.3.	7-9	1	Math	C	LN	The Sub-sets of the Pond
I.B.3.	10-12	Various	Biology	L	DRW	Collecting and Cultivating Marine Bacteria
I.B.3.	10	Various	Biology	B	CCM	A Biological,Chemical and Physical Survey of Delaware's Tidal Streams
I.B.3.	7-12	Various	Life Science, Earth Science	B,F	WHA	The Ecology of Sand Dunes
I.B.3.	K-12	Various	All	C	RWS	Marine Aquaria
I.B.3.	7-12	Various	Earth Science, Geography	F	REL	A Study of a Stream (White Clay Creek)
I.B.3.	7-12	Various	Science, Geography	F,L	OC,JH,DW	A Study of White Clay Creek

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
I.B.3.	10-12	Various	Biology	B,L,F	RB	A Study of Pond and Stream Life in Newark Area
I.B.3.a.(1)	7	Various	Science	C	BJB,JBL, VMP	Water and Shore Birds
I.B.3.a.(1)	4-7	1-2	Science	B,L	MER	Transpiration Contributes to the Water Cycle
I.B.3.a.(1)&(2)	7-12	Various	Life Science	L	RWS	Some Observations of Life in a Pond (Aquarium)
I.B.3.b.(1)	7-10	3	Science, Biology	F,C,L	LN	Dissolved Oxygen Limits Aquatic Populations
I.B.3.b.(1)	9-12	Various	Biology	F	HJD	Zonation of a Rocky Coast
I.B.3.b.(1)	7-10	1	Biology, Life Science	I	MAN	Interspecific Relationships
I.B.3.b.(1)	10-12	Various	Biology, Science	F,L	DRW	To Recognize, Record and Analyze Characteristics of a Sandy Beach Environment
I.B.3.b.(1)	7-9	Various	Science	F,C	HBD	The Rocky Shore
I.B.3.b.(1)	10	45 or Various	Biology	F,C	WLD	Life at the Delaware Seashore
I.B.3.b.(2)	6-10	Various	Biology, Life Science	L	CJW	Succession in a Freshwater Ecosystem
I.B.4.	6-8	Various	Science	L,C	CJ	The Microscope and Marine Invertebrate Taxonomy

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
I.B.4.a.(3)	7-9	Various	Science	F,C,L	JO	Microfossils from the Local Marine Environment
I.B.4.a.(3)	7-8	6	Science	C,F	DEH	Life Along the Delaware Shore
I.B.4.a.(3)	K	Various	Science	C	PPM	Animals With Shells
I.B.4.a.(3)	7	10	Science	C	LJO	The Starfish
I.B.4.a.(3)	3-6	4 or Various	Science	C	GFG	The Not-So-Common Oyster
I.B.4.a.(3)	7-9	1	Science	C	CS	Identification of Ducks
I.B.4.a.(3)	2	Various	Science	F,C	HCR	Muskrats: Structure and Function
I.B.4.a.(3)	12	10	Advanced Biology	C,L	WRH	Polychaetes
I.B.4.a.(3)	5	Various	Science	C	AHK	The Blue Crab
I.B.4.a.(3)	6-7	4	Science	C	FAC,WJL, JCM	An Introduction to Sharks
I.B.4.a.(3)	10	Various	Biology	L	JSD	Sharks: Anatomy and Behavior
I.B.4.a.(3)	7-10	1-2	Biology, Life Science	C	DEB	Coelenterates
I.B.4.a.(3)	7-9	Various	Social Studies, English	C	RTD	The Year of the Whale

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
I.B.4.a.(3)	7-10	Various	Life Science, Biology	C,L	CEW	A Comparative Study of Clam and Squid
III.A.1.	6-8	Various	Social Studies	B,C	MJT	Utilization of Marine Organisms by the Indians
III.A.1.	2-4	Various	Social Studies	B,C	HCR	Food From the Sea
III.A.1.	6-12	None	Social Studies	B	PSJ	The Oceans as a Source of Food
IV.C.	9-12	Various	Home Economics, Biology, Science, Social Studies	C	SAA	The Ocean: Source of Nutrition for the Future
IV.C.3.	8-9	6	Science	C,L	NER	Freshwater from Seawater: The Process of Desalination
IV.C.3.	7	1-2	Social Studies, Geography	I	JDP	Soviet Arctic Seaway: Self-Directed Study Unit
IV.C.3.a.	1	5	Social Studies	C	EGM	Ships and Seaways
V.A.1.	7-8	3	Social Studies	C	THA	The Sea: Can It Feed the World?
V.A.2.j.	10-12	4	Social Studies	C,I	WC	Economic and Political Exploitation of Marine Resources
V.B.1.a.	10-12	Various	Science, Biology	B,L	LW	Report of an Experimental Study of the Effects of a Pesticide on Killifish
V.B.1.a.(3)	7-9	Various	Science	C,L	RWB,THM	The Effects of Pesticides on Wildlife
V.B.1.a.(3)(k)	9-12	5 or Various	Biology, Science	B,L	OC	The Causes and Consequences of Eutrophication of Streams

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
V.B.1.a.(3)(e)	7-10	2	Biology	I	PCS	Effects of DDT on Osprey Reproduction
V.B.1.b.	7-12	-	Social Studies, Science	B	LN	Background Paper: Mercury, A Real Problem
V.B.1.b.	7-12	Various	Science	B	JAA	The Direct Effects on Some Plants and Animals of Pollution in the Great Lakes.
V.B.1.b.	9-12	5	Social Studies	B	KLH	Economics of Oil Pollution
V.B.1.b.(1)	12	1	Physics	C	HJB	Atoms for Peace or Pollution?
V.B.1.b.(1)(h)	5-8	Various	Science	B	JAA	Power or Pollution
V.B.1.b.(2)	10-12	7	Science, Social Studies	B,L,C	AD	Use of the Marine Environment As a Depository for Waste Materials
V.B.1.b.(2)(e)	9	5-10	Social Studies	C	DMH	Whatever Happened to the Brandywine?
V.B.1.c.	5-12	2-3	Biology	L	HJD	Testing Water for Bacterial Pollution
V.B.1.c.(1)(a)	4-5	1	Reading	C	JFM	Water: The Common Waste Recipient
V.B.2.b.	5-12	2-3	Biology	L	HJD	Testing Water for Bacterial Pollution (White Clay Creek)
V.B.2.b.(1)(a)	4	3	Science	C	PCS	Constant Water

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
V.B.2.b.(1)(b)	5-8	4	Science	C,L	PCS	Water Is a Must
V.B.2.b.(1)(c)	5-8	1+	Science	B,C,L	PCS	Water Must Be Re-Used
V.B.2.b.(1)(d)	5-8	2	Science	C	PCS	The Omnipresent Microbe
V.B.2.b.(1)(e)	9-12	1	Social Studies	C	PCS	What Can I Do About Water Pollution?
V.B.2.b.(1)(f)	9-12	3-5	Social Studies, Science	B,C,L	PCS	What Does A Glass of Fresh Water Cost?
V.B.2.b.(2)	Special Education	Various	Science	C,F	AER	Pollutants Upset the Pond Ecology
V.B.2.b.(2)	6	Various	Science	L	LY	Reaction of Fishes to Changes in Temperature
V.B.2.b.(2)	9-10	3	Biology	L	HBD	Measuring Dissolved Oxygen
V.B.2.b.(2)	7-12	Various	Science, Geography	F,L	OC,JH,DW	A Study of White Clay Creek
V.B.2.b.(2)	7-12	Various	Science	L	USDA	Nitrate Water Activities
V.B.2.b.(2)(a)	7-12	3	Science	L	JH	What's In a BOD Test?
V.B.2.b.(2)(a)	4-6	1	Science	C,L	PCS	What's In the Water?
	6	1	Science, Social Studies	C,L	PCS	What About Water Pollution in Your Area?
	7	1	Science	C,L	PCS	What Effects Do Sediments Have On Water Quality?
	4-6	1	Science	C,L	PCS	How Is Water Filtered?
	1-3	1	Science	C,L	PCS	Let's Learn About Water

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
V.B.2.b.(2)(b)	5-8	2	Science, Social Studies	C	PCS	Who Killed Lake Erie?
V.B.2.b.(2)(e)	9-12	3	Science, Social Studies	B,C,L	PCS	How Are Sewages & Wastes Treated?
V.B.2.b.(2)(f)	10	Various	Biology	B,L	LW	Growth of Blue-Green Algae in a Pollution Level Nitrate Solution
V.B.2.b.(2)(f)	10	3-4	Biology	C	PCS	Aged Water
V.B.2.b.(3)(a)	K-4	1-2	Science, Social Studies	C	ADM	Water For Fun
V.B.2.d.	7-12	Various	Biology, Social Studies	I	HJD	Thermal Pollution
V.B.2.d.(1)	5	1-2	Reading	C	JFM	Who Killed Wykens Creek?
V.B.2.d.(2)	4-5	1-2	Reading	C	JFM	Useful Plants of the Sea
V.B.2.d.(7)	7-12	2-3	Biology	B,I	HJD	Pesticides & the Environment
V.C.2.b.(8)	9-12	1	Biology, Science, Social Studies	I	VG	Effect of Pollution on Species of Stream Animal Life
V.C.3.	7-12	Various	Earth Science, Social Studies	C	HMK,REL, DR	Simulation Game--Water: Demand vs. Limits.
V.E.2.	10	5	Biology	C	FDC	The General Adaptation Syndrome

Concept Number	Suggested Grade Level	Number of Periods	Suggested Subject Area(s)	Type of Material*	Initials of Writers**	Title of Lesson
VI.B.1.a.	7-12	Various	Social Studies	C	FH	1. Political Decision Making--A Role Playing Activity for Social Studies 2. The Governor's Task Force--A Role Playing Activity for Social Studies 3. Delaware Coastal Zone Act-Environmental Quality or Party 4. Economical Impact of CZ Decision-A Role Playing Activity
VI.B.1.a.(3) & (4)	4-6	1	Social Studies	C	TW	Water: Supply & Demand
VI.B.2.b.(3)	7-12	Various	Home Economics, Science, Biology, Social Studies	C	SAA	The Ocean: Source of Nutrition for the Future

MARINE
TEACHING RESOURCE PACKET CONTRIBUTORS

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Harry M. Kreider
W. John Layton, Jr.
Robert E. Lewis
James B. Long
Merrill E. Lynch
John C. Maciarello
Catherine C. Martin
Patricia P. McBath
John F. McDermott
Robert K. Miller
Thomas H. Milspaw
Anne D. Murray
Elsie G. Murray
Leonard Navitsky
M. A. Newber
Scott J. Nicodemus
Jon Osterholm
Lawrence J. O'Toole
Jay D. Poole
Verna M. Price
Alice E. Reynolds
Helen C. Richardson
Wayne E. Rigby
Robert D. Rinehart
Michael E. Riska
Nancy E. Rocheleau
David Ruth
Beatrice H. Sammons
David R. Snow
Charles Stein
Mary L. Stein
Robert W. Stegner
Patricia C. Stetson
Mary J. Thomas
Lawrence Wasserman
Deborah Wheatcraft
C. J. Wheatley
David R. Williams
Clarence E. Workman
Lynda Yazulla

11. Assessment of Success

Fifty-seven experimental editions of teaching resource packets were produced as an initial step in establishing a marine environment studies program. Teachers in 17 or 70% of the districts in the state were prepared as a cadre to implement marine studies in their schools. Tests are being developed to measure the expected changes in the cognitive and affective postures of pupils and teachers who have made use of the materials.

A lesson evaluation form (see attachment) was developed to assist in revision of the materials as they are used by teachers.

12. Commitment from Other Sources

NOAA Sea Grant Funds partially funded the fall and spring courses and materials reproduction. Space and resources of the Milford School District's Sea Beside Us Project were used for the in-service aspects of the program.

LESSON EVALUATION FORM

Date ________ ________

Population Curriculum Study Concept No. ____________ (e.g. V.A.1.a.2.)

Statement of concept or subconcept ____________

____

Title of lesson ____________

Subject area in which lesson was used ____________ Grade level ______

Evaluator's name (optional) ____________ School ____________

General impression of lesson ____________

____

Receptivity of: most capable students ____________;

average students ____________; least capable ____________.

Are effects measurable? ______ How? ____________

____

Do you think attitude changes resulted? ____ What changes? ____________

____

What learning skills were used by the students? ____________

____

Is the lesson readily usable ______ Instructions to teacher adequate? ____________

Visual aids adequate? ____________ Time required? ____________

Background information adequate? ______ Bibliography adequate? ____________

How much teacher preparation needed? ____________

____

Suggested improvements or additions: other materials to add or substitute? ________

____

____

Please attach copies of materials you used to improve lesson, giving sources. If materials cannot be attached, please describe briefly. ____________

____

____

Recommended deletions____

Needs editing?______ Too elementary? __________ Too difficult?__________

Would you use again? _________. Did lesson lead to cooperation with other teachers and if so in what subject areas?____

Was lesson readily adaptable to existing instructional program?__________

Please identify the course of study in which this lesson was included, e.g., Green Version BSCS Biology or High School Geography Project.__________________

____

Was this lesson a substitute for another______. If so, please identify__________

____

What other lessons would you like to have in this area? __________________

____

____

General recommendation:____

____

____

____

____

____

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____

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____

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____

Please return to:
Population Curriculum Study
College of Education
University of Delaware
Newark, Delaware 19711

3-72

Financial Statement

Marine Environment Project

Total Amount Allocated - NSF		$19,899
Summer 1971	6,900	
Supplemental Grant	12,999	
Total	19,899	
Total Amount Allocated - Du Pont		$12,600
Total		$32,499
Total Amount Expended		$19,050
Summer 1971		
Participant Support	12,600	
Salaries	5,535	
Supplies & Expenses	715	
Travel	200	
Total	19,050	
Supplemental Grant		
No funds were expended.		
Amount Carried Over to FY 73		$13,449
Cost Per Participant - Summer		$ 405

Del Mod Project #71-2

1. Project Name - Population-Environment Curriculum Study

2. Project Directors - Robert W. Stegner
   Val E. Arnsdorf

3. Component Assignment - University of Delaware

4. Districts Involved - Tower Hill School
   Alexis I. DuPont School District
   Marshallton-McKean School District
     Marbrook Elementary School
     McKean High School
   Newark School District
     Ogletown Junior High School
     Christiana Senior High School
     Jennie E. Smith Elementary School
   Capital School District, Dover
     William Henry Middle School
   Mount Pleasant School District
     Mount Pleasant Senior High School
   Friends School
   Alfred I. DuPont School District

5. Participants - 30 See Appendix

6. Total Students Affected - 2,500

7. Objectives

   To produce a K-12, multidisciplinary school program and a corps of trained teachers in population-environment studies. It is proposed that the implementation of a problem-solving study program in schools will increase the students' understanding of man and the natural system and will improve his critical thinking ability for democratic decision-making. At the same time the multidisciplinary nature of the program will serve as an articulating influence in the schools.

8. Target Population - K-12 teachers in all subject fields

9. Time Per Participant - Summer: 4 hours per day for 6 weeks

10. Brief Account of Activities

    During the summer 1971, twenty-four teachers worked for eight weeks preparing teaching resource packets under the direction of Dr. Robert Stegner and Dr. Val Arnsdorf. The packets were designed to achieve part of the conceptual objectives of the conceptual scheme for Population-Environment Studies prepared previously by the Population Curriculum Study. Twenty-four packets were prepared for use in multidisciplinary, K-12 programs. The list of these materials is included as an attachment.

The 1971-72 lecture series to provide public awareness and introductory information for teachers was supported through the University of Delaware Continuing Education Division.

Two one-day briefing sessions on the use and evaluation of teaching resource packets were held on April 17 and April 21, 1972. Forty-two teachers attended, representing eleven school districts. Substitutes for the teachers who required them were paid by funds from the DuPont Company. One hundred and seventy-one titles were requested for field trial and evaluation. The replies will be used for revision of these materials.

11. Assessment of Success

"A Conceptual Scheme for Population Environment Studies", "A Sourcebook for Population-Environment Studies" and "Inventory of Experimental Lesson Plans and Background Materials" were published during the year to meet the first objective. A corps of trained teachers exist in eleven districts of Delaware. The experimental materials have been evaluated by some teachers using the same evaluation form as already included in the Marine Curriculum Project.

12. Amount and Source of Commitment from Sources Other Than Del Mod

Division of Continuing Education	$ 2,000
Cooperative Center for Educational Development	$32,375
Use of facilities in the University and local schools	

THE POPULATION CURRICULUM STUDY
University of Delaware

INVENTORY OF LESSON PLANS FOR POPULATION-ENVIRONMENT STUDIES

Concept Number	Suggested Grade Level	# Class Periods*	Suggested Subject Area	Initials of Writers**	Specific Title of Lesson
General	7-12	V	Eng.,Soc.St., Science	HD	Quotations on the Environment
General	7-9	V	Language Arts	TD	Environment Vocabulary
I.B.1.a.	7-12	1	Science	TVS	Determination of Atmospheric CO_2
I.B.3	7-12	V	Earth Sci., Geography	RFL	A Study of a Stream (White Clay Creek)
I.B.3.	7-12	V	Science, Geography	OC, JH,DW	A Study of a Stream (White Clay Creek)
I.B.3	10-12	V	Biology	RB	A Study of Pond and Stream Life in Newark Area
I.B.3.b.(1)	7-12	1	Biology or General	HD	Measuring Populations, Parts I and II
I.B.3.b.(1)	7-12	2	Science, Soc.St.	HD	Predator-Prey Relationships in Wolf-Moose Popula.
I.B.4	7-12	2-3	Soc.St., Science	FH	Man's Great Rush Towards Deadly Dullness
III.A.	10-12	V	Soc.St., Mathematics, Geography	KLH	1.Population Distribution 2.Continental Patterns of Dist. 3.Man-Land Ratio 4.Classification & Identifica. of Populations 5.Factors Affecting Population Distribution
III.B	10-12	V	Soc.St. Mathematics, Geography	KLH	1.Man-Land Ratio 2.Classification and Identification of Populations. 3.Demographic Identification of Populations 4.Factors Affecting Population Distribution
IV.A	10-12	V	Soc.St.	KLH	Population Dynamics

* V = Various amounts of time
** See list of contributors attached

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
IV.B.	10-12	V	Soc. Studies	KLH	1.Man-Land Ratio 2.Demographic Identification of Populations 3. Factors Affecting Population Distribution
IV.C.	10-12	V	Soc.Stud.	KLH	1.Classification and Identification of Populations 2.Demographic Identification of Populations.
IV.C.2.g.	7-8	1	Soc.Stud.	TH	Irrigation & Agriculture Production
V.A.	10-12	V	Soc. Stud.	KLH	Overpopulation Rationale and Readings
V.A.	5-12	V	Soc.Stud., Science	Hu.Com.	Teacher Background on Human Hunger
V.A.1	7-12	1+	Soc.Stud.	DW	Population & Living Standards
V.A.1.a.	K-4	V	Soc. Stud.	CB	Various Sources of Material on Vocational Skills
V.A.1.a.	K-4	1	Soc. Stud.	LB	Men & Women are Paid for their Work
V.A.1.a.	5-8	V	Soc. Stud.	LB	Job Skills & Unemployment
V.A.1.b.	K-4	1+	Soc.Stud	CB	World Food Deficit
V.A.1.c.	5-8	1+	Soc. Stud.	LB	Causes of Unemployment
V.A.1.d	9-12	2-3	Soc.Stud., Science	JF	1.Technology,Agriculture and Population 2.Productivity of Agricultural Land
V.A.1.e.	7-12	1+	Soc. Stud., Science	ES	Agriculture, Population, & Hunger
V.A.1.e.	7-12	1	Soc. Stud., Science	JA	Population and Natural Resources
V.A.1.e.	5-8	V	Soc. Stud.	DW	Journey In Space
V.A.1.f	7-12	1+	Soc. Stud.	RD	Problems of Population Distribution

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
V.A.1.g.	9-12	1+	Soc. Stud.	ES,AL	Population & Living Standards
V.A.1.h	9-12	1+	Soc. Stud., Science	DW	Population vs. Education
V.A.2	7-12	V	Soc. Stud.	KLH	Survey Introduction to Demographic Studies-Global Populations
V.A.2.b.	3-7 5-8 9-12 5-9 4-9	V	Science, Soc. Stud., Health	OC	1.Microgardening 2.Food Processing & Storage 3.Vitamin C Loss in Stored Foods 4.Insect Pests 5.Canned Food
V.A.2.c.	7-12	1	Science, Geography	CR	1.The Agricultural Realm 2.Erosion (An Investigation) 3.Soluble Minerals in the Soil
V.A.2.e.	7-12	1-2	Science, Soc. Stud.	HK	Processed Foods (Extensive Teacher Background)
V.A.2.f.	5-8	V	Soc.Stud., Geog.,Math.	SmcC	1.The Nature of Agricultural Products Affects Distribution 2.Man's Decisions 3.Geo.Characteristics Affect Trans.
V.A.2.g.	7-12	1+	Soc. Stud.	LB	The Problems of Using Food Surpluses
V.A.2.i.	9-12	1+	Soc. Stud.,	RB	Cultural Influences on Diet
V.A.2.j.	9-12	V	Soc. Stud.	KLH	The Game of Farming
V.A.2.l	9-12	V	Geography, Soc. Stud.,	FS	Foreign Exploitation of Resources
V.A.3.	K-4	V	Soc. Stud.	JmcD	A Job Provides an Income
V.A.3.	K-4	1	Soc. Stud.	LB	People Need to Earn an Income
V.A.3.a.	7-8	5	Soc. Stud.	DR	An Experience with Prejudice
V.A.3.b.	7-8	3	Soc. Stud.	FL	Relationship Between Land Ownership and Standard of Living Land Ownership Game (Gr.3-6)

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
V.A.3.c.	7-9	1	Soc. Stud	PS	Variations in Income in the U.S.
V.A.3.d.	9-12	1	Soc. Stud.	PS	Some of the Effects of Uncontrolled Strip Mining
V.A.3.f.	10-11	V	Soc. Stud.	PS	Hunger and the Poor
V.A.3.g.	10-12	1+	Economics	JmcD	The U.S. Budget
V.A.4	9-12	1	Soc. Stud.	HD,TW, BP	1.Costs & Economics of World Armaments
		1			2.Costs & Economics of Armaments
		1			3.The Effects of War on the Productive Capacity of a Country
	5-8	1			4.War May Destroy Resources
		1			5.War Disrupts Efforts to Alleviate Poverty and Hunger
V.A.5.a.	9-12	1	Science, Home Ec	AM	Nutrient Relationships Must Be Observed in Augmenting Diets for the Malnourished.
V.A.5.a(1)	K-4	1	Health	LB	All People Need Food for Energy
V.A.5.a(2)	K-4	V	Science	JP	The Identification & Composition of Some Basic Foods
V.A.5.a(2)	K-4	1	Science, Health	LB	People Need Many Kinds of Food for Health and Growth
V.A.5.a(3)	5-8	1	Health, Sci.,Ho.Ec.	LB	How Much Food Do You Need?
V.A.5.a(4)	8-12	1+	Biology, Gen Science, Home Ec	AM	Food and Malnutrition
V.A.5.a(5)	5	1	Science	LB	Food Should Contain Protein, Carbohydrates, Fats, Minerals, and Vitamins
V.A.5.a(7)	9	1+	Soc. Stud., Science, Ho.Ec,Health	LB	The Effects of Malnutrition
V.A.5.a(8)	7-9	V	Soc Stud., Ho.Ec,Geog.	AM	Most of the World's Protein Foods Come from Plant Sources
V.A.5.a(8)	6-8	1+	Soc.Stud., Ho Ec.,Geog.	JH	Most of the World's Protein Foods Come From Cereal Grains

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
V.A.5.a(9)	7-12	1	Geog.,Sci. Health	LB	Malnutrition Affects 1/2-2/3 of the World's Population
V.A.5.a(10)	10-12	V	Soc.St., Health Ho.Ec.	AM	Amino Acids are Essential to Man's Health
V.A.5.a(12)	7-12	V	Soc. Stud. Health, Ho.Ec.	AM	Cereal Proteins Can be Supplemented with Amino Acids
V.A.5.b.	K-4	V	Soc.Stud. Science	JP	Nutrition of the Poor
V.A.5.b(3)	7-9	1+	Soc. Stud.	LB,RL	The Relation of Income to Diet
V.A.5.b(4)	6+	1	Science, Soc.Stud., Home Ec	ES	The Nutrition of the Poor
V.A.5.b(5)	7-12	1	Soc.Stud.	RL	The Poor Pay More
V.A.5.b(6)	7-9	1-2	Science, Soc. Stud., Home Ec	AM	Cost of Protein
V.A.5.b(6)	5-8	1	Science Soc. Stud.	RL	The High Cost of Meat Protein
V.A.5.c.	K-4	15	Soc. Stud. Science	JP	Human Fulfillment is Restricted by Poverty and Hunger
V.A.5.d.	7-12	10-12	Soc.Stud., Science, Language Arts	RE,RS	A Quality of Life
V.B.	10-12	V	Soc. Studies	KLH	Overpopulation Rationale & Reading
V.B.	9-12	--	Soc. Stud., Science	VS	Background Papers on the Quality of Life
V.B.1	9-12	--	Soc. Stud., Science	WP	Background Paper on Farm Waste Disposal
V.B.1.a.	7-12	2	Science, Soc. Stud.	HD	The Impact of Food Production On the Biosphere

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
V.B.1.a(1)(a)	4	1-2	Reading	JmcD	The Least Weasel
V.B.1.a(1)(a)	4	1-2	Reading	JmcD	The Bird that Survived
V.B.1.a(2) (a)(ii)	K-2	1-2	Science	LB	The Control of Destructive Insects
V.B.1.a(2) (a)(xi)	9-12	1	Science	LB	Getting to Know Beetles
V.B.1.a(3)(e)	7-10	2	Biology	PS	Have You Seen a Peregrine Falcon Lately?
V.B.1.b	7-12	--	Soc.Stud.	ND	Background Paper: The Economic Social, & Physical Impact of the American Automobile & the Implications
V.B.1.b	7-12	--	Soc. Stud., Science	LN	Background Paper: Mercury, A Real Problem
V.B.1.b	9-12	5	Soc. Stud.	KLH	Economics of Oil Pollution
V.B.1.b (1)(h)	5-8	V	Science	JA	Power or Pollution
V.B.1.b. (2)(e)	9	5-10	Soc.Stud.	CWH	Whatever Happened to the Brandywine?
V.B.1.c.	5-12	2-3	Biology	HD	Testing Water for Bacterial Pollution
V.B.1.c	9-12	--	Social Stud.	LS	Background Paper: Human Behavior & Its Relation to Environmental Problems
V.B.1.c.	9-12	--	Soc. Stud.	JFC	Background Paper: Industrial Pollution
V.B.1.c.(1)	5-8	3-4	Soc.Stud.	DW	Density and Disease
V.B.1.c(1)(a)	5	1	Reading	JmcD	Water: The Common Waste Recipient

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
V.B.l.c. (1)(b)	6-7	1-2	Science, Soc.Stud.	DW	What's In a Barrel of Trash
V.B.l.c. (1)(g)	7	3-4	Soc.Stud.	DW	Where Do We Put Our Waste?
V.B.l.c. (1)(h)	7	1	Science	DW	Burn, Baby, Burn
V.B.l.c. (1)(i)	7-9	1	Science	DW	Water, Water Everywhere...
V.B.l.c. (1)(l)	9	1	Earth Sci.	DW	Where Does Waste Go?
V.B.l.c(2)	K-4, 5-8	3	Soc.Stud.	TW	What Difference Does the Package Make?
V.B.l.c. (2)(b)	5-8	6	Soc. Stud.	TW	The Disposable Society
V.b.l.c. (2)(g)	9-12	2-3	Soc. Stud.	TW	Why Isn't Recycling Acceptable?
V.B.2	5-12	2	Soc. Stud.	CP	America the Beautiful
V.B.2	10-12	--	Soc. Stud., Science	JW	Background Paper: A Water Quality Study of White Clay Creek
V.B.2.a	4	2	Reading	JmcD	What is Air/Noise Pollution?
V.B.2.a	7-12	4	Soc. Stud., Science	JP	How Does Air Pollution Affect Plant Life?
V.B.2.a.(1)	K-4, 5-8 9-12	V	Science, Soc. Stud.	CR	The Air is Everywhere
V.B.2.a(1)	9-12	4-6	Soc. Stud, Science, Heal.	JP	Take a Deep Breath
V.B.2.a(1)	9-12	3	Soc. Stud.,	SE	What Goes Up Must Come Down

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject	Initials of Writers	Specific Title of Lesson
V.B.2.a(2)	9-12	4-6	Soc.Stud., Science	JP	The Air We Live In
V.B.2.a(2)(a)	9-12	2	Soc.Stud., Science	JP	Air of Disaster
V.B.2.a(2)(b)	9-12	2	Soc.Stud., Science	JP	Spoiled Crops
V.B.2.a(2)(e)	5-8 7-9	3	Soc.Stud., Science	JP	The Unclean Sky
V.B.2.a(3)	7-9 11-12	2	Soc.Stud.	DR	Money in the Air
V.B.2.a(3)(a)	7-12	1	Soc. Stud.	DR	Who Pays for Clean Air?
V.B.2.b.	5-12	2-3	Biology	HD	Testing Water for Bacterial Pollution
V.B.2.b(1)(a)	4	3	Science	PS	Constant Water
V.B.2.b(1)(b)	5-8	4	Science	PS	Water Is a Must
V.B.2.b(1)(c)	5-8	1+	Science	PS	Water Must Be Re-Used
V.B.2.b(1)(d)	5-8	2	Science	PS	The Omnipresent Microbe
V.B.2.b.(1)(e)	9-12	1	Soc.Stud.	PS	What Can I do About Water Pollution?
V.B.2.b(1)(f)	9-12	3-5	Soc. Stud., Science	PS	What Does A Glass of Fresh Water Cost?
V.B.2.b(2)	7-12	V	Science	USDA	Nitrate Water Activities
V.B.2.b(2)(a)	7-12	3	Science	JH	What's In A BOD Test?
V.B.2.b(2)(a)	4-6	1	Science	PS	What's In the Water?
	6	1	Science, Soc.Stud.	PS	What About Water Pollution in Your Area?
	7	1	Science	PS	What Effects Do Sediments Have on Water Quality?
	4-6	1	Science	PS	How Is Water Filtered?
	1-3	1	Science	PS	Let's Learn About Water

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject Area	Initials of Writers	Specific Title of Lesson
V.B.2.b.(2)(b)	5-8	2	Science, Soc.Stud.	PS	Who Killed Lake Erie?
V.B.2.b.(2)(c)	5-8	3	Science	PS	The Phosphate Controversy- a Case Study
V.B.2.b.(2)(d)	5-8	1	Science	PS	Do Farms Pollute?
V.B.2.b.(2)(e)	9-12	3	Science Soc.Stud.	PS	How Are Sewages & Wastes Treated?
V.B.2.b.(2)(f)	10	3-4	Biology	PS	Aged Water
V.B.2.b.(3)(a)	K-4	1-2	Science, Soc.Stud.	AM	Water For Fun
V.B.2.c.	K-12	1	Science	JmcD	Soil Pollution
V.B.2.c.(1)	4-5	2	Science	JmcD	Soil Appearance
V.B.2.c.(2)	4-5	2	Science	JmcD	Soil Quality and Productivity
V.B.2.c.(3)	4-5	4-5	Soc.Stud., Science	JmcD	Soil Means Life
V.B.2.c.(4)	7-9	2-3	Science	JmcD	Soil Pollution
V.B.2.c.(5)	7-8	1-2	Science	JmcD	Life in Soil
V.B.2.c.(7)	9-10	5-6	Science	JmcD	Salt of the Earth
V.B.2.d.	7-12	V	Biology, Soc.Stud.	HD	Thermal Pollution
V.B.2.d.	7-9	1-2	Math.	ES	Mathematics in Conservation
V.B.2.d.(1)	5	1-2	Reading	JmcD	Who Killed Wykens Creek?
V.B.2.d.(2)	4-5	1-2	Reading	JmcD	Useful Plants of the Sea
V.B.2.d.(6)				FS	(Being written)
V.B.2.d.(7)	7-12	2-3	Biology	HD	Pesticides & the Environ.
V.B.2.d.(8)	10-12	3-4	Science	FL	Poisoned Power

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject Area	Initials of Writers	Specific Title of Lesson
V.C.	10-12	V	Soc.Stud.	KLH	Population Dynamics Overpopulation Rationale and Reading
V.C.1.	9-12	--	Soc.Stud.	--	Background Paper: The Roots & Dimensions of the Food Crisis
V.C.1.a.(1)	4-6	1	Science	HK,RB	Characteristics and Uses of Trees (+work sheet)
V.C.1.a.(5)	5-8	1	Science	RB	Development of Soil
V.C.1.b.(2)	4-5	1	Reading	JmcD	The Fisher & the Porcupine Story
V.C.1.b.(7)	5-8	1	Science, Soc.Stud.	RB	Forest Management (film)
V.C.1.b.(9)	9-12	1	Soc.Stud.	RB	Agricultural Practices in Ancient Civilizations
V.C.2.	--	--	--	CB	Background & Bibliography on Depletion of Resources
V.C.2.a.	--	--	--	CB	Source Material "Depletion of Resources"
V.C.2.a.(1)	K-4	1	Soc.Stud. Science	CB	Mining & Quarrying Practices
V.C.2.a.(3)	K-4	1	Soc.Stud.	CB	Man's Use of Energy
.C.2.a.(4)	K-4	1	Soc.Stud., Science	CB	Comparing Supplies of Mineral Resources
.C.2.b.(8)	9-12	1	Biology Science Soc.Stud.	VG	Effect of Pollution on Species of Stream Animal Life
V.C.3.	5-8	--	--	RB	Background Paper:Effect of Urbanization on Environment (suggested lessons for elementary grades)
.C.3.	7-12	V	Earth Sci., Soc.Stud.	HK,RL DR	Simulation Game--Water: Demand vs. Limits

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject Area	Initials of Writers	Specific Title of Lesson
V.C.3.	4-9	1-3	Soc.Stud.	RK,JM	Using Aerial Photos to Study Land Use
V.C.3.a.	4-6	4	Soc.Stud.	RP	Urbanization & Uses of Land
V.C.3.b.	7-12	V	Soc.Stud., Science	KLH	Background:Urbanization Tends to Deplete Local Water Supplies
V.C.3.b.(1)	7-12	V	Science, Soc.Stud.	KLH	Water Distribution & Consumption Patterns (4 lessons)
V.C.3.b.(2)	7-12	2	Math,Science Soc.Stud.	KLH	Consumption of Water in Large Cities
		1/2	" "	KLH	Reading a Water Meter
V.C.3.b.(3)	7-12	V	Soc.Stud., Science	KLH	Urbanization & Availability of Water
V.C.3.b.(4)	7-9	1	Earth Science	RL	Urbanization & Flooding
V.C.3.b.(5)	7-12	1	Earth Sci., Geography, Urban Stud.	KLH	Cities & the U.S. River Systems
		1	" "	KLH	Cities & the U.S. River Systems (map study)
V.C.3.b.(6)	K-12	V	Science, Soc.Stud.	KLH	Industrial Use of Water--Field Trip to Hagley Mus.
V.C.3.b.(7)	7-12	2	Soc.Stud.	KLH	Urban Growth & Water
V.C.3.b.(9)	7-12	2	Soc.Stud.	KLH	Nationwide Water Use
V.D.	9-12	--	Science, Soc.Stud.	VS	Background Paper on the Quality of Life
V.D.	7-9	5	Lang.Arts	TD	Preparing Written Descriptions of Environmental Scenes
V.D.1.	6-8	3-4	Science, Soc.Stud.	SmcC	Introduction to Environmental Issues

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject Area	Initials of Writers	Specific Title of Lesson
V.D.1.	7-12	1	Art, Soc.Stud.	CP	City Images
V.D.1.	7-8	5	Language Arts	TD	Preparing Written Descriptions of Environmental Scenes
V.D.1.	7-12	V	Soc.Stud.	FH	Locating the Oil Refinery
V.D.1.a.	4-6	V	Art, Eng. Soc.Stud.	TD	Beauty in Nature
V.D.1.c.	4-6	V.	Art,Eng., Soc.Stud.	TD	The Price of Beauty
V.D.1.(f)	5-8	1	Soc.Stud	SmcC	A Study of Progress
V.D.1.(g)	5-8	1	Lang. Arts	SmcC	Tomorrow's Picnic
V.D.2	5-8	3-4	Science, Soc.Stud.	SmcC	Introduction to Envir. Issues
V.D.2.a	3-4	2	Art,Eng. Soc.Stud.	CP	Environmental Quality Game
V.D.2.a.	3-6	1	Science, Soc.Stud.	CP	"Beach" Game
V.D.2.b	7-9	1-2	Eng.,Art, Soc.Stud.	CP	Using the Senses to Describe Nature Forms
V.D.2.b.	7-9	1	Civics	SmcC	Who in Our Society Litters?
V.D.2.c.	6-8	1	Civics	SmcC	Environmental Incongruities In Mass Media Commercials
V.D.2.d.	7-9	1	Eng.,Art Soc.Stud.	CP	The Influence of Industry & Commerce on Esthetic Quality of the Environment
V.D.2.e.	6-12	1	Civics	SmcC	Industry & Government Responsibilities in Resource /Environment Management
V.D.2.c.	6-12	1	Lang.Arts, Sci.,Soc.Stud.	SmcC	A Crisis in Values
V.E.	10-12	V	Soc.Stud	KLH	Overpopulation Rationale

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject Area	Initials of Writers	Specific Title of Lesson
V.E.	--	--	Sociology, Biology	VP	Background Paper: Social Effects of Population Growth
VI.A.1.a.	7-12	2-3	Biology, Math., Soc. Soc. Stud.	BJ	Impact of Reproduction Rates on Population Growth
VI.A.1.a.	10	2	Soc. Stud.	BJ	Relationship Growth Rates to Rate of Resource Use
VI.A.1.b.	--	--	Science, Soc. Stud.	DE	Background Paper: Pill and Population Control
VI.A.1.b.	--	--	Soc. Stud.	UL	Background Paper: India-Population Problems & Prospects
VI.A.1.c.	--	--	Soc. Stud.	UL	Background Paper: India - Population Problems & Prospects
VI.A.1.c.	--	--	Soc. Stud.	HF	Background Paper: Role of Church in Environment
VI.A.1.c.(4)	9-12	V	Soc. Stud.	BJ	History of Contraceptive Methods
VI.A.1.c.(5)	--	--	Soc. Stud.	MM	Background Paper: Optimum Population for Puerto Rico
VI.A.2.c.(3)	7-9	1	Soc. Stud. Science	RL	Comparison of Pesticide Effectiveness to Toxicity
VI.A.3.a.	5-9	1-2	Science, Soc. Stud.	MB	Field Trip: Bombay Hook Refuge Ecology
VI.B.1.a.	7-12	V	Soc. Stud.	FH	1. Political Decision Making--A Role Playing Activity for Social Studies 2. The Governor's Task Force--A Role Playing Activity for Social Studies 3. Delaware Coastal Zone Act-Environmental Quality or Party 4. Econ. Impact of CZ Decision-A Role Playing Activity

Concept Number	Suggested Grade Level	# Class Periods	Suggested Subject Area	Initials of Writers	Specific Title of Lesson
VI.B.1.a.(3)	4-6	1	Soc.Stud.	TW	Water:Supply & Demand
VI.B.1.a.(4)	4-6	1	Soc.Stud.	TW	Water:Supply & Demand
VI.B.2.a.	10-12	1	Biology	MD	Nitrogen Cycle
	5-8	1	Soc.Stud. Science	MD	Processing Solid Wastes
VI.B.2.a.(1)	7-9	1	Science	HK	Distillation of Wood - Pyrolysis Process
VI.B.2.b.	5-6	1	Science, Health	ES	Nutritional Values of New Food Products
VI.B.2.b.(1)	4-5	1	Reading, Lang.Arts	JmcD	Farming Methods in the Future
VI.B.3.	--	--	Economics	JD	Background Paper:Economic Factors in Population Growth
VI.B.3.b.	--	--	--	AM	Background Paper: Literacy & Population-Environment Issues
VI.B.3.e.	5-8	V	Science, Soc.Stud.	SmcC	Political & Economic Factors In Environmental Use

LESSON PLAN CONTRIBUTORS

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Financial Statement

Population & Environment Project

Total Amount Allocated - NSF			$30,785
Summer 1971	$ 9,600		
Supplemental Grant	21,185		
Total	$30,785		
Total Amount Allocated - DuPont			$17,500
Total			$48,285
Total Amount Expended			$27,100
Summer 1970			
Participant Support		$17,500	
Salaries		6,575	
Supplies & Expenses		3,025	
Total		$27,100	
Supplemental Grant			
No funds were expended.			
Amount Carried Over to FY 73			$21,185
Cost Per Participant - Summer			$ 903

Del Mod Project 71-23

1. Project Name - Leadership Training

2. Project Director - Robert L. Uffelman

   Other Staff - Bruce Watt, Consultant

3. Component Assignment - University of Delaware

4. Districts Involved - Claymont
   New Castle-Gunning Bedford
   Conrad Area
   Capital
   Milford
   Seaford
   Indian River
   Wilmington Diocese

5. Participants - 13 (See Appendix for list of participants.)

6. Total Students Affected - 1,160

7. Objectives

   To prepare experienced teachers as inservice instructors and clinical experienced supervisors for pre- and inservice teachers. Specifically, participants will become proficient in:

   A. Construction of auto-tutorial science education materials.
   B. Inservice education strategies.
   C. Classroom observation assessment.

8. Target Population

   Experienced middle or junior high school classroom teachers in schools participating in Field Agent Projects.

9. Time Per Participant - 3 hours per week for 15 weeks

10. Activities

    The original proposal was modified because budget changes did not permit employing science supervisors at the local level. Leadership Trainees were identified from the 1970-71 junior high school program and the 1971-72 junior high school program to plan district inservice activities. During the fall, Dr. Uffelman prepared instructional materials, tests and identified potential participants. Fourteen seminar sessions were held at the Resource Center, Georgetown Branch of the Delaware Technical and Community College during the spring semester and five during the summer session to identify appropriate behavioral objectives, to prepare instructional materials and to develop modules, tests, and comprehensive assessment instruments. An example of one module is included.

Inservice education materials were prepared for the mathematics concepts included in new science programs and also for the "processes of scientific inquiry". Some are auto-tutorial and others are designed for group instruction. The Inquiry Skills Assessment was administered to about five hundred junior high students by Leadership participants, and to twenty-five elementary school teachers. The instrument was revised as "Inquiry Skills Test, Form B" and administered to the eighty participants in the Department of Public Instruction summer workshop for objective-based curricular planning. The Teacher's Manual includes the test items, objectives measured and statistical data from the pilot trials.

The materials which were developed were:

Mary Pratt	Manual for Mathematics in EXCP
Sally Kehoe	Manual for Mathematics in IME
Frank Hutton	Inventory of Facilities and Materials for IMB
Michael Stemniski	Density Module Grade U-9
Gloria Aluise	Field Testing Process Measure Grade 4
Virginia Stafford	Field Testing Process Measure Grade 5
Margaret Webb	Field Testing Process Measure Grade 7
Mark Davis	Inquiry Skill Module
Mitchell Gordon, Jr.	Inquiry Skill Module
John F. Hollis	Inquiry Skill Module
W. John Layton, Jr.	Inquiry Skill Module
Thomas W. Milspaw	Inquiry Skill Module
Ehret B. Page	Inquiry Skill Module

Another activity, The Teacher Competency Study, included identification of behavioral objectives for selected teaching strategies judged as necessary skills for teachers of science. Their acceptance was determined for selected summer session participants. We found that acceptance of some objectives is influenced by teaching experience. This information will assist Field Agents and inservice instructors to identify skills that may need special emphasis for beginning teachers and for those having difficulty in changing their classroom practices. The objectives will be used by Dr. C. W. Knight II in developing the observation guides for the "General Science Teaching Strategies Project." Plans are underway to extend this study to the national scene. These objectives are attached.

The Teacher Competency Study findings will also be used during 1972-73 to determine if there are any relationships between acceptance of the objectives and achievement-gain scores for Grade 8 classes in the Delaware Assessment Project conducted by the Research Division of the State Department of Public Instruction.

Another activity of the Leadership project included strategies for changing teacher-classroom behavior. Mr. Bruce Watt, consultant, directed this phase. He submitted the following report:

The initial position as project consultant was confirmed and accepted January 3, 1972 with duties outlined as described.

A. To assist with constructing self-instructional modules to train observers in operating the classroom observation tabulators for a 10 x 10 matrix.

B. To make matrices of classroom observations from video tapes and on-site visitations. The exact number of hours devoted to each matrix will be determined by Del Mod visitation team. This portion of Mr. Watt's activities has been previously described in the report of the Del Mod Research Director, Dr. John Bolig.

At the conclusion of the initial contract the Director of the Del Mod System and the Coordinator at the University of Delaware made the decision to continue the consulting opportunity on a monthly basis.

Another activity of Mr. Watt's involved the analysis of 47 audio tapes made by teachers of the middle school and junior high grades who were attending an inservice program conducted by Del Mod Field Agent Barbara Logan.

One of the primary responsibilities of the project consultant was to help develop a self-instructional module to train observers to use a method for objective analysis of classroom verbal behavior. The essence of this endeavor was to develop a self-instructional program utilizing a matrix tabulator designed by the project consultant. The module "Your Verbal Portrait" was produced in an experimental edition. The Research and Development Center and the Science Education Center at the University of Texas was visited to obtain additional information in this regard.

The central idea was to determine if the concept of a matrix tabulator was a proficient and reliable method for obtaining data.

11. Assessment of Success

Inquiry skills test was completed and field tested with participants and their students. It will be used in several Del Mod projects as base-line data and for evaluations. All the Leadership participants will utilize their modules during 1972-73. Inservice education plans are not completed for local school districts, but progress is being made.

The Classroom Observation Module was completed and tested with summer school participants in the Physical Science Project.

Materials and programs developed by this project are to be included in University courses. The new courses created for this project replaced the traditional offerings. The close cooperation evolved from these activities have influenced other units of the University. The success of the individualized competency-based teacher education materials is leading the college toward a computerized-managed instructional program. This trend permits the faculty to provide for individual differences; to routinize those elements of the program that are improved by this approach; and to gain more time for individual and small group interaction between faculty and students. The utilization of public school classrooms for clinical experiences of trainees will result in a field-oriented, broad-based, pragmatic teacher education program for novices and for experienced educators.

12. Amount and Source of Commitment from Other Sources

DuPont Company provided twenty thousand dollars for Leadership Fellows. Only thirty-five hundred was used during 1971-72 because plans were changed. These Fellowships have been awarded for 1972-73 and funds are available for Inservice Leadership Activities. The University contributed half-time clerical services and computer time. Delaware Technical and Community College contributed space for seminars and meetings. Local school districts provided instructional materials for Trainees to field-test their modules. Staff members from the American Association for the Advancement of Science critiqued the Inquiry Test and provided suggestions for improving the instruments. Dr. Ned Flanders, Far West Regional Education Laboratory, provided consultation for the classroom observation module activity.

TEACHER ACCEPTANCE OF OBJECTIVES FOR TEACHING STRATEGIES

	PRESERVICE TEACHER ELEMENTARY			INSERVICE TEACHER ELEMENTARY			INSERVICE TEACHER SECONDARY		
	YES	NO	UNDECIDED	YES	NO	UNDECIDED	YES	NO	UNDECIDED
Classroom teachers should be able to do the following:									
Planning Instruction									
1. Identify appropriate objectives and utilize them for planning instruction.	27	0	1	9	0	0	10	0	0
2. Construct behavioral and non-behavioral objectives.	24	0	4	8	1	0	9	0	1
3. Select evaluation tasks appropriate to the stated behavioral objectives	25	0	3	8	0	1	10	0	0
4. Plan discriminating questions (recall, higher order, evaluative, convergent, divergent).	18	4	6	7	1	1	9	0	1
5. Identify the prerequisite performances needed by each learner.	25	2	0	8	0	1	10	0	0
6. Plan assignments or "follow-ups" which enable the learner to attain the behavioral objectives.	26	2	0	9	0	0	10	0	0
7. Select instructional methods and learner activities appropriate for the tasks. (Deductive, inductive, lecture, group discussion, individualized instruction, laboratory investigation, audio-visuals).	26	0	2	8	0	1	10	0	0
Collecting and Using Data									
8. Identify critical data necessary for diagnosing individual needs.	22	1	5	7	1	1	7	0	3

	PRESERVICE TEACHER ELEMENTARY			INSERVICE TEACHER ELEMENTARY			INSERVICE TEACHER SECONDARY		
	YES	NO	UNDECIDED	YES	NO	UNDECIDED	YES	NO	UNDECIDED
9. Plan appropriate learning experiences to meet individual needs.	25	1	2	7	1	1	8	0	2
10. Diagnose the strengths and weaknesses of learners from a set of papers or tests and plan specific remediation tasks.	14	5	9	7	1	1	7	1	2
Arranging Classroom Facilities									
11. Arrange furniture, materials, and learners so the facilities are conducive to conducting instruction and the learners are comfortable, can see and hear.	27	0	1	8	0	1	10	0	0
12. Collect or return papers and instructional materials with minimum disturbance.	24	2	2	9	0	0	9	0	1
13. Identify hazards to the physical safety of learners and initiate corrections when needed.	27	0	1	9	0	0	9	1	0
Teaching Style									
14. Identify one teaching skill or behavior which he wishes to modify from a taped lesson or micro-teaching session.	19	0	9	7	1	1	8	1	1
15. Change his own teaching behavior or skill which he has identified as needing improvement.	27	0	1	8	0	1	10	0	0
16. Utilize a specific teaching behavior or skill in a classroom with varying types of students (slow learners, willing learners, heterogeneous groups).	19	7	2	8	1	0	8	0	2

	PRESERVICE TEACHER ELEMENTARY			INSERVICE TEACHER ELEMENTARY			INSERVICE TEACHER SECONDARY		
	YES	NO	UNDECIDED	YES	NO	UNDECIDED	YES	NO	UNDECIDED
Using Instructional Media and Laboratory Equipment									
17. Operate a 16 mm. sound-film projector, an overhead projector, an opaque/overhead projector, a tape recorder, a slide/film-strip projector, a film-loop projector and video recorder.	22	0	6	8	1	0	10	0	0
18. Use a variety of media, such as books, movies, programmed texts, audio-tutorial modules, tapes and laboratory equipment, selected upon basis of carefully established criteria.	27	0	1	9	0	0	10	0	0
19. Use media to clarify and emphasize main ideas.	27	0	1	9	0	0	9	0	1
20. Use media to motivate a new study.	26	1	1	9	0	0	9	0	1
21. Conduct a follow-up to a presentation and determine if the immediate objectives were met.	23	3	2	9	0	0	10	0	0
Interacting in the Classroom									
22. Ask questions which require recall of facts, questions of higher order, probing questions, feeling questions, and questions which facilitate creativity.	26	1	1	8	0	1	9	0	1
23. Vary the stimulus situations by pausing and pacing.	17	6	5	6	2	1	7	0	3
24. Praise learners both verbally and non-verbally in order to reinforce productive behavior.	27	0	1	9	0	0	10	0	0
25. Use learner's ideas during the course of a lesson.	26	0	2	9	0	0	10	0	0

	PRESERVICE TEACHER ELEMENTARY			INSERVICE TEACHER ELEMENTARY			INSERVICE TEACHER SECONDARY		
	YES	NO	UNDECIDED	YES	NO	UNDECIDED	YES	NO	UNDECIDED
26. Establish and maintain eye contact.	26	1	0	9	0	0	8	0	7
27. Withhold verbal comment.	6	18	4	3	4	2	6	2	2

Evaluating Learners

	PRESERVICE TEACHER ELEMENTARY			INSERVICE TEACHER ELEMENTARY			INSERVICE TEACHER SECONDARY		
	YES	NO	UNDECIDED	YES	NO	UNDECIDED	YES	NO	UNDECIDED
28. Determine if the objectives of the lesson have been achieved by asking learners to give examples which illustrate the main point.	26	0	2	7	2	0	10	0	0
29. Construct a plan for securing questions, opinions, and responses for a group of learners or for individuals.	21	2	5	6	1	2	8	1	1
30. Observe informal learner reactions to his instruction.	25	0	3	8	1	0	9	1	0
31. Evaluate the attending behavior of learners by observing posture, gaze level, and responses.	19	4	5	8	0	1	8	0	2
32. Construct tests or follow-ups of a lesson and evaluate them to determine if the objectives were attained.	27	0	1	8	0	1	8	1	1
33. Demonstrate procedures involving the learners in self-evaluation.	24	0	4	6	2	1	7	1	2

MODULE:

THE SKILLS OF SCIENTIFIC INQUIRY

Preliminary Draft

Inquiry Skill:

_X_ Observation and Inference
___ Variables
___ Definitions
___ Measurement
___ Classification
___ Organization of Data
___ Constructing Hypotheses and Generalizations
___ Testing Hypotheses
___ Modifying Hypotheses and Generalizations
___ Verifications
___ Communication
___ Model Building

Prepared by:

_X_ Davis, Mark L. II
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___ Hollis, John
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Preparation of these materials was sponsored by the DEL MOD Leadership Project with support from the National Science Foundation Grant No. G. W. 6703

DEL MOD SYSTEM DOVER, DELAWARE

OBSERVING AND INFERRING

Objective: To involve the student in a series of activities that develop his skill in observing and drawing inferences.

Materials Needed :

1. chalk
   sugar
   salt
   bullion cube
   chocolate
2. paper clips
3. cloth for blindfolds
4. glass of water
5. spoons
6. matches
7. 1/2 gal. milk cartons
8. coat hangers (wire) 1 for each 1/2 gal. milk carton
9. 1/2 pt. milk cartons--2 for every 1/2 gal carton

Teacher Task :

1. Provide each student with any one of the objects listed in the material list for Activity I.

2. Provide students with paper clips, coat hangers and milk cartons for making equal arm balance in Activity II.

3. Provide materials for Activity III.

4. Provide baker's chocolate for Activity IV as the unknown object.

Student Task :

1. Complete Activities I through IV.

2. Answer the questions at the end.

3. Clean up your work area and return all materials to their proper place.

ACTIVITY I: Observing--using the five senses

1. Look at the object. Can you see it? What does it look like? What color is it? Can you tell what it is composed of?

2. Touch the object. Can you touch it? What does it feel like? Is it hot or cold? Is it wet or dry? Is it rough or slippery? Can you tell by feeling what it is composed of?

3. Smell the object. Can you detect any odor? Have you ever smelled anything like it before? What does it smell like? Can you tell by smelling what it is composed of?

4. Drop the object on the desk. Does it make a sound when it hits the desk top? Can you describe the sound that it made? Is the sound that it made like the sounds that other objects make when dropped on the table? Can you tell by the sound of the object what it is composed of?

5. Taste the object. Does the object have any taste or flavor? Is it like anything that you have tasted before? What does it taste like? Can you tell by tasting what it is?

ACTIVITY II: Developing statements of observation

Materials Needed : 1/2 gallon milk carton
Coat hanger
2 - 1/2 pint milk cartons
Chalk used in Activity I
20 paper clips

1. Build a simple balance with the materials given you.
   a. Open the coat hanger and straighten to form the beam of the balance.
   b. Open the paper clips and form hooks to hold the pans.
   c. Cut out one side of each of the two 1/2 pint milk cartons to form pans for your balance. Put a hole through the seam that was formed when the carton was sealed. Hang the pans on the balance using these holes and the hooks that you made.
   d. Close up the pour spout of the 1/2 gallon milk carton and seal with glue.

e. Place the beam and the pans on the top of the 1/2 gallon milk carton and balance.

f. Your balance is ready to use.

2. Look at the paper clips and the chalk. How do they compare in size? Which is larger?

3. How many paper clips are equal or nearly equal to the weight of the chalk?

4. Write a statement telling how the paper clips and chalk compare in both size and in weight.

ACTIVITY III: Constructing statements of observable change

Materials Needed : Matches
Spoons
Glass of water
Chalk
Paper clip

1. Place the chalk of Activity I in a glass of water and stir.

    a. Does the chalk change in size? How?

    b. Does it change in shape? How?

    c. Does it change in appearance? How?

    d. Is there any change in the feel? Explain.

    e. Is there any change in the smell? Explain.

    f. Is there any change in the taste? Explain.

    g. Is there any change in the sound that it makes when dropped? Explain.

2. Place the chalk in a spoon or on a straightened paper clip and heat over the flame of a match.

    a. Does the chalk change with heat? How?

    b. Is there any change in the odor? How?

    c. Is there any change in the taste? How?

    d. Is there any change in the feel? How?

    e. Is there any change in the sound that it makes when dropped? how?

3. Crush, break or pull apart the object.

   a. Can you crush it, pull it apart or break it?

   b. Is there any change in size and shape? Explain.

   c. Using the five basic senses tell if there have been any changes with crushing, breaking and pulling apart of the chalk. Explain.

ACTIVITY IV: Distinguishing between observations and inferences

Materials
Needed : Blindfold
Unknown object

An inference is a conclusion that is arrived at from observations

1. Select a partner or two partners to work with.

2. Have your partner blindfold you.

3. Have your partner get the unknown object from the teacher.

4. Have your partner drop it on the desk. What sort of noise did the object make when it struct the table? Describe it. What do you think the object is?

5. What did the object smell like? Describe it. What do you think the object is?

6. What does it feel like? Describe it. What do you think the object is?

7. What does it taste like? Describe it. What do you think the object is?

Can you answer these questions?

1. What are the five senses that are used in observing?

2. Could you set up an experiment where you show the weight or volume of an object. Tell what you would do.

3. Can you tell what will happen to an object if it is put in water, put on fire, or frozen? Answer in your own words.

4. What do you think inferences are?

Rationale:

All sciences require that the individual be aware of objects or changes. In order to be aware of things or changes we must be able to observe. Observing involves using the five basic senses.

Sometimes scientists are able to observe changes, but may not be able to see the thing that brought about the change. In this case they make an inference or statement based upon knowledge and experience as to what happened or why it happened.

Financial Statement

Science Leadership Training Project

Total Amount Allocated - NSF		$17,400.
Total Amount Allocated - DuPont		$20,000
Total		$37,400.
Total Amount Expended		$19,410
Participant Support	$ 2,000	
Salaries	15,695	
Supplies & Expenses	215	
Equipment	1,500	
Total	$19,410	
Amount Carried Over to FY 73		$17,990
Cost Per Participant		$ 1,493

Science Resource Center

The Science Resource Center at the University of Delaware has been set up to serve the schools of New Castle County. It is under the directorship of the Component Coordinator, Dr. Robert Uffelman, assisted by Miss Mary Trenholm, library aide, and Mr. John Herrmann in the audio-visual laboratory.

The Resource Center is the central facility in plans for increased utilization of new science materials and self-instructional modules in both pre and inservice courses in the College of Education. The Center was located in Suite 206 and Room 205A during 1971-72. It was staffed by a full-time library aide, a part-time graduate science-media specialist and several part-time undergraduate assistants. Materials from the former Science Education Reading Room and from the Elementary Science Classroom were located in the new spaces. Shelves, cabinets and furniture were installed to facilitate the operation of the Center.

Former offices in Suite 206 were used as Conference Rooms, Individual Study/Testing Spaces, Audio-Visual Preview Room, Video-Tape viewing, periodical library and a circulation desk. These facilities were shared by faculty in non-science fields who needed spaces for similar activities. A guide to the Center was developed as an aid to locating material. This guide is attached.

Another space, Room 013A, was equipped as a Self Instructional Audio Visual Equipment Laboratory. During the year more than six hundred university students and inservice teachers, both elementary and secondary in all subject fields,used this facility. Participants in the Field Agent Program visited the laboratory many times. Visitors averaged 2.5 hours each to learn how to operate the eight pieces of audio-visual equipment.

The Center published R. L. Uffelman, Getting Involved in Del Mod Activities and R. L. Uffelman and C. W. Knight, II, Study Guide for Teachers, Science -- A Process Approach. One hundred individual student kits to accompany the Guide were assembled and circulated by the Center staff. A slide-tape "introduction to the Center" and University of Delaware Science Resource Center were prepared by Mr. John Herrmann for orientation of visitors.

A master list of science curriculum materials was prepared by the Del Mod Component Coordinators. This list was used to select classroom kits and Teacher Manuals for Science -- A Process Approach, Elementary Science Study Units, Science Curriculum Improvement Study, Introductory Physical Science, Earth Science Curriculum Study, Inquiry Development Project and portions of other recent programs. Film loops, slides and tapes for these programs were purchased, also. New texts and teacher references were purchased or donated by the publishers. The collection is not complete, but is nearly so.

A plan for distribution and utilization of the materials was tried. As a result of user requests, duplicate materials will be purchased for the most popular programs. These will be available for classroom trial to augment the evaluations made by teachers at the Center. Modules developed by local district projects are being added to the collections.

The Center was opened officially in January, with hours from 9:00 a.m. until 7:00 p.m. During the June Summer Session, the Center was used for extended hours by instructors and their students. Plans were completed during June for re-locating the Center on the ground floor of Willard Hall. Last minute negotiations are being completed. Additional staff will be employed to provide greater service. The College budget was increased by the University to provide the funds.

As part of the evaluation of the Science Resource Center, a tally was kept of the number of visits.

SUMMARY OF VISITS

	Resource Center	Audio Visual Laboratory
October	40	---
November	60	80
December	56	76
January	77	---
February	204	108
March	478	239
April	380	110
May	460	83
June	480	closed
Total	2235	696

Two instruments were used to evaluate the Center. Visitors were asked to complete the Evaluation Form or the Student Feedback Summary to assist the staff in revising the program and facilities. The forms and findings are included as an attachment.

During 1972-73, schools will be surveyed to determine impact on local programs that can be traced to the Science Resource Center.

Because the Del Mod collection is the core of the College Resource Center, it received many tangible and intangible benefits. Forty hours of student assistant time per week was provided from College of Education funds. An average of four hours of supervisory time and unlimited equipment maintenance was provided by the University Instructional Resources Center. The Associate Dean, Billy E. Ross, devoted ten percent of his activity to supervision of the College Resource Center. Secretarial services for preparation of materials were provided by each department using the Center.

Participants and staff feel the Center is more efficient than the practice of using faculty offices and the laboratory-classroom for display and dissemination of new science materials. The individualized materials permit use of technician staff time in place of faculty time for teaching. The financial impact of changing these responsibilities will become more evident as the practice comes into wider use. Use of the Audio Visual Equipment Laboratory provides for additional training that was not feasible in the former teacher education program.

The Resource Center, by operational definition, is designed to facilitate systemization. It is used by field agents, faculty, teacher trainees, inservice teachers, school administrators and project staff. Materials developed by all Del Mod projects are housed in the Center. The extended hours provide for utilization at times when these materials would not be available to the cooperating schools and institutions. Similar cataloging schemes at both Del Mod Science Resource Centers encourages greater use of materials and facilitates communication with teachers and other participants.

The University of Delaware has already been influenced by the development of the Del Mod Resource Center. The immediate impact is seen in the plans for creating a College Resource Center for all curriculum areas. Additional space and a more accessible location were provided to house the Del Mod collection. The proposal for expanding the college facility is included in the Appendix.

UNIVERSITY OF DELAWARE
SCIENCE RESOURCE CENTER

206 Willard Hall Education Building

The Science Resource Center
is supported by Grant No. GW 6703 from the
National Science Foundation
to the
DEL MOD System

DEL MOD SYSTEM DOVER, DELAWARE

3

Welcome to the Resource Center at the University of Delaware. The purpose of this publication is to introduce you to the Center and to explain the operational policies. The Resource Center was created in an effort to make new curriculum materials available for examination by teachers, administrators, teacher educators, and university students. The science education facilities at the University maintained a modest collection of curriculum resources. However, it was not adequate to serve the heavy demands made on it by the public schools and our students. During 1971-72, major acquisitions, additional space, and staff were obtained through support of the Del Mod System from the National Science Foundation, the Office of Education, industry, University funds, and private sources. Additional materials and continued staff support will be added to meet the needs of Delaware schools.

Please examine the small diagram of the Resource Center. You enter through the Office in room 206. As indicated by the key in the lower portion of the diagram, the Resource Center maintains periodicals, books, films, science equipment for building kits, and science curriculum kits.

Later, as you walk up aisle number 1, you will find science textbooks on the left side of the aisle. The elementary and senior high science textbooks used in Delaware are represented in this collection. On the right side of the same aisle are supplementary science books and trade books for the areas of astronomy through zoology. These books are for examination at the Resource Center only. However, in the case of a special project they may be borrowed for three days with a maximum of one renewal allowed.

Some supplies are available to students and teachers for assembling their own kits for classroom use. These materials may be signed out for a maximum period of one week. You will find four of the cabinets at the end of aisle number 1 and on the left side of aisle 2.• Passing down aisle 2 you will see the professional education books on the right side. These books may be signed out for one week. • At the end of aisle 2 on the left side is a collection of film loops to accompany the new curricula. These films may be used in the viewing room or a study space.

On the left side of aisle 3 are the materials from the Elementary Science Study program. While the equipment is available only for examination at the Resource Center, the Student and Teacher Manuals may be borrowed for 3 days.

On the right side of aisle 3, you will find a complete collection of materials from the Science Curriculum Improvement Study program.

In aisle 4, you will see a complete collection of classroom materials for Science -- A Process Approach. Once again, these curriculum materials may be examined at the Resource Center. We do not have a large enough collection to permit circulation.

The periodicals located in room 206 are for your reference use in the Center.

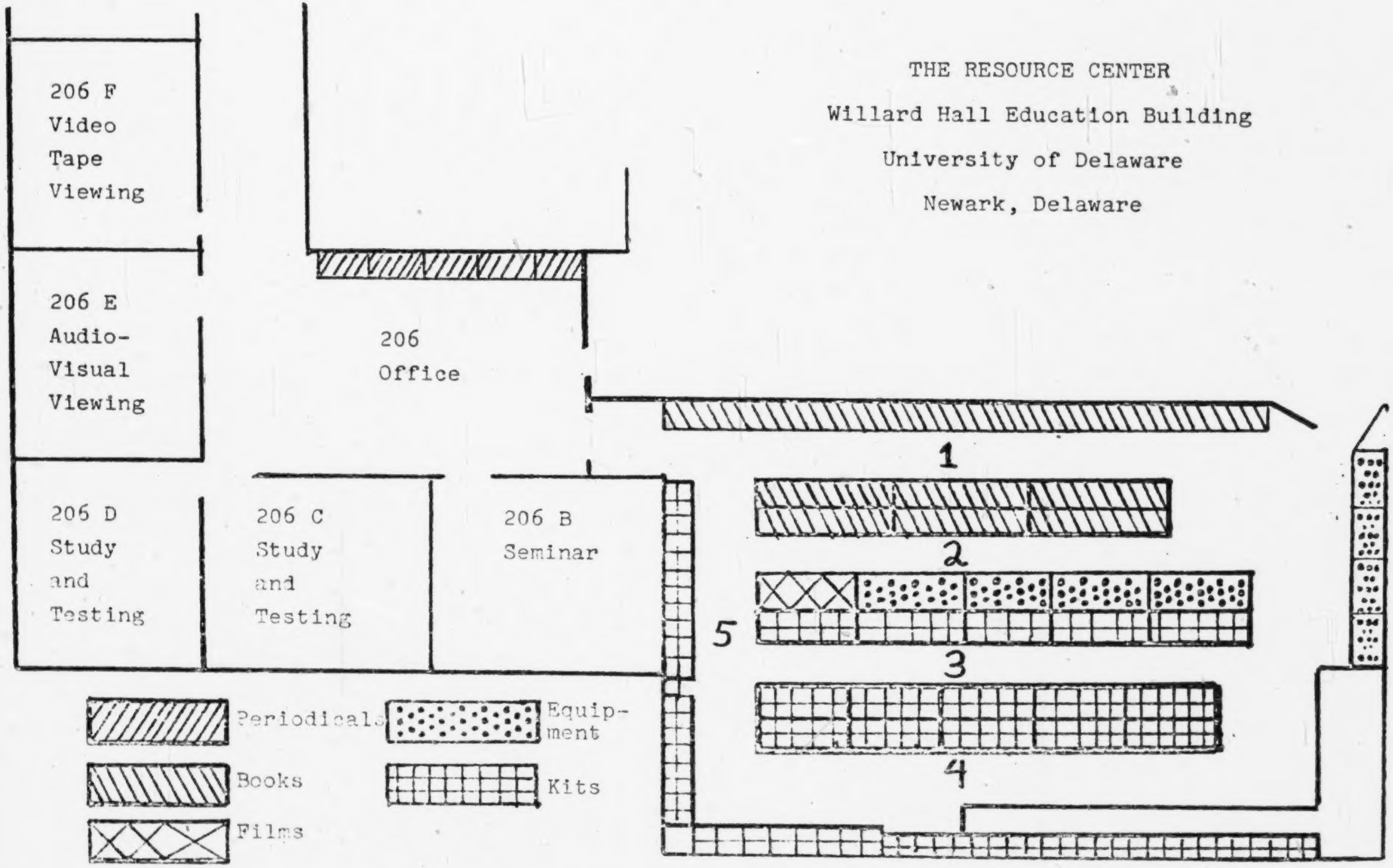
In addition to providing materials for examination, the Resource Center provides space for field agents, faculty and school personnel to conduct individual and inservice group sessions to evaluate these materials for possible local use.

Look once more at the diagram. Room 206B is a small seminar room. Rooms 206C and 206D are for independent study and testing. Room 206E is an audio-visual viewing room. It contains a 16 mm projector, a filmstrip projector, film loop projectors, and a card reader. Room 206F is the video-tape viewing room. If you do not know how to operate this equipment, you can learn in the Self-tutorial Audio Visual Equipment Laboratory in room 013 on the ground floor. The laboratory supervisors will help you.

Now, I suggest that you make your own tour of the Resource Center and make a closer inspection of the materials available for examination and borrowing. The Resource Center is presently open from 10:30 AM to 7:00 PM Monday through Thursday and 8:30 AM to 5:00 PM on Friday.

If you have any questions concerning the Resource Center, please see Miss Trenholm, the Assistant Librarian, in room 206.

THE RESOURCE CENTER
Willard Hall Education Building
University of Delaware
Newark, Delaware


206 F Video Tape Viewing
206 E Audio-Visual Viewing
206 Office
206 D Study and Testing
206 C Study and Testing
206 B Seminar
1
2
3
4
5
Periodicals
Books
Films
Equipment
Kits

VISITOR EVALUATION FORMS

RESOURCE CENTER

What do you like about the Center?

How could we best serve you in the field of Education?

SELF-INSTRUCTION AUDIO VISUAL EQUIPMENT LABORATORY

What do you like best about the laboratory?

How could the laboratory serve you better?

2/1/72

RESOURCE CENTER EVALUATION

Summary

Pre-Service Student Feedback

Spring 1972

1. Operating Policies and Procedures

Hours:

More	5
More morning	4
Later evening	5

Personnel:

List of personnel at what hours	5
One to help students organize experiments	5

Organization:

Better cataloging	9
A reserve system	1
Orientation tour	1
Longer sign-out period	1

2. Physical Facilities

Larger area	3
More equipment & resource material (acid-base material)	7
More use of SAPA materials inside the individual boxes	
More films, filmstrips and tapes	

3. Suggestions for Changes in New Center

1.	A place to sit	
2.	More check-out equipment	
3.	Have sections labeled -- students to find own material	
4.	More resources	4
5.	More personnel	3
6.	Longer hours	
	Night	5
	Before School	3
7.	A library of text and reference materials	
8.	A separate equipment room	
9.	Try to coordinate materials with elementary schools	
10.	Slide program on usage of materials and what there is available	
11.	Display areas -- change often -- include use of A-V materials	
12.	Special meetings to teach use of SAPA's materials	
13.	Send materials to elementary schools	

4. Times Visited

No. of visits	No. of students
1	1
2	3
3	2
4	3
5	2
6	3
7	4
10	2
20	1
20 - 25	1

5. Hours spent in Resource Center

Hours in Center	No. of students
1/2	2
3/4	1
1	3
1-1/2	1
2	4
2-1/2	2
3	4
4	2
5	1
7	1
10	1

6. Twenty students reported the staff was not available for conferences or assistance during their visits.

UNIVERSITY OF DELAWARE
NEWARK, DELAWARE
19711

DEL MOD SYSTEM
015 WILLARD HALL EDUCATION BUILDING
PHONE: 302-738-1230

Student Feedback Summary
Spring, 1972
Science Resource Center

Circle Session
I II

Now that you have had the opportunity to use the Science Resource Center in conjunction with Ed. 373, Elementary School Science, what changes would you recommend in relation to: (use the reverse side if necessary)

(1) Operating Policies:

(2) Physical Facilities:

Future plans may have the Science Resource Center moving to the ground floor in the Education Building. What suggestions do you have for the facilities if this move occurs?

Next year, 1972-73, the science methods course will be conducted entirely in the respective elementary schools. Considering the new 1972-73 schedule, what suggestions do you have for the Science Resource Center? (All methods classes will meet mornings in elementary schools)

How many times did you visit the Science Resource Center (outside of actual class meetings)?

Approximately how much total time did you spend in the Science Resource Center (excluding actual class meetings)?

Were there ever occasions when you visited the Science Resource Center but the person on duty was unavailable and subsequently, you were not able to "sign in"? If so, approximately how many times?

Additional Comments:

RESOURCE CENTER

VISITORS' EVALUATION COMMENTS

1971-2

RESOURCE CENTER

What do you like about the Resource Center?

The helpfulness of the personnel, the lack of rigid pointless policy and red tape. The availability of rooms.

The practical experience that can be obtained through use of the various materials.

Reference copies of texts.

There are a lot of helpful resources available. Also John was helpful in finding different types of materials and activities.

I liked the center because it contained a variety of resources and various materials which were very helpful. I was especially pleased with the help that John gave me, without his guidance I would have been lost. He was more than willing to help with problems.

John Herrmann is extremely helpful and the resource center has a great deal of equipment and ideas for science experiments.

Center has a lot of material available and John in extremely helpful to the student.

You can borrow pieces of equipment and books and get an idea of what is included in different science programs.

Merely that it exists much better help and more able to give the sort of things we need, made with the course in mind.

I especially like looking around and I would also like to use the SAPA material.

Judging from what I seen I think it meets a long time need. I liked idea of being able to have everything that is needed for a demonstration at hand.

Merely that it exists - much better help and more able to give the sort of things we need. Made with the course in mind.

I was able to check out materials for use in my school - which is a school in a low-income area with little equipment. My students loved it.

The materials located here.

Service and equipment.

Well supplied, limit lending schedule

It's great to be able to go to center and get practically all the equipment we need for experiments - also, the collection of books has been helpful. The center has really been a life saver - and foot saver.

It has been very helpful in our teaching. All the materials we've needed has been available and checked out with no problem what so ever. We've done alot of experiments and could not have gotten all the materials on our own.

Very well organized - suits my needs beautifully.

All the individual rooms provide good study and test centers without disturbance.

It has a great number of ideas and materials particularly helpful to the novice science teacher!

How could we best serve you in the field of Education?

Continue to loan materials. Help with ideas to set up a science program for different ages - 2nd grade in my case.

Stay the same!

Could we sign out a film loop for the SRA Inquiry Development Program - to use in a classroom session (Elementary School) and return it the same day? I'd like to borrow the Stalled Car for just one day.

Long hours during summer for those who are still teaching during the summer.

Continuing to keep equipment used in education science programs. Such as AAAS or ESS.

Materials available to be checked out- perhaps with low-cost rental fees to cover breakage and general use.

Maybe have more projects available and have a larger film library and make films available to students.

Through the implementing of more experiments and demonstrations in the field of science.

Get more reference copies of texts.

Have a larger amount of resources (# of copies) available.

Continue with the resource center and people who are very helpful and knowledgeable.

The resource center has books and people that are a great deal of help when trying to organize lessons.

By maintaining a supply of materials and helping prepare experiments, etc.

Give demonstration lessons of how different parts of science programs equipment can be used in the elementary school.

It could best serve me by the use of materials and equipment.

I feel that the experiments should cover a broader field than that is present at the center now. (eg.) more secondary Education exposure especially in chemistry. More films in different science topics should be available. The only films that are available now are on biology and come with the kit. For instance as a student teacher sometimes I may feel that a film would do a good job clarifying a concept. Also more visual aid materials that can be used with the machinery should be available.

Financial Statement

Science Resource Center

Total Amount Allocated - NSF		$39,825
Total Amount Expended		$36,567
Salaries	$14,467	
Materials	16,000	
Equipment	5,000	
Travel	1,100	
Total	$36,567	
Amount Carried Over to FY 73		$ 3,258

DELAWARE STATE COLLEGE

Delaware State College Component Coordinator -

The Component Coordinator at Delaware State College, Dr. Columbus Ricks, has also served as the professional staff person for the UPSTEP program. In this dual capacity he has worked with the other Component Coordinators in planning and carrying out overall Del Mod activities. By the nature of the participation of Delaware State College in the Del Mod System, the activities have been somewhat limited.

Financial Summary

Component Coordinator

Total Amount Allocated - NSF	$11,903.00
Total Amount Expended -	$ 3,853.00
Amount Carried Over to FY 73* -	$ 8,050.00

* Since the Component Coordinator and the Director of the UPSTEP program were the same, this amount was carried over to FY 73 as part of Component Coordinator's salary for FY 73. Amount carried over includes $1,553 indirect costs.

Del Mod Project No. 71-24

1. Project Name - UPSTEP

2. Project Director - Dr. Columbus Ricks

3. Component Assignment - Delaware State College

4. Districts Involved - All participants were pre-service teachers.

5. Name & Number of Participants - 9

Miss Sherilyn Johnson	Mr. Stephen R. Pennypacker
Mr. Ronald Matthews	Mr. John Greene
Mrs. Alice Nauman	Miss Caron A. Harmon
Mr. Lawrence Drummond	Mrs. Susan Berry Layton

Miss Vickie Mockbee

6. Objectives

To train prospective students to become middle school/junior high school science teachers.

7. Target Population - Teacher will be prepared for grades 5 through 8.

8. Activities

The UPSTEP Program at the Delaware State College came under the umbrella of the Del Mod System beginning with the 1971-72 school year; therefore, the involvement of Delaware State College in the Del Mod Program during the 1971-72 school year was limited to participation in the UPSTEP Program. The UPSTEP Program is a preservice program to train middle school/junior high school teachers in science education.

Two courses were revamped and taught to majors in the UPSTEP program. These courses are:

201 Physical Science Survey

Materials: Activities from Level I and Level II, from Intermediate Science Curriculum Project (ISCS) were carried out by the students.

Texts: Probing the Natural World, Level I (Principles from Physics). Probing the Natural World, Level II (Principles from Chemistry).

General: Materials which are now housed in the UPSTEP Director's office, but will become a part of the Science Resource Center in September 1972. Additional references were required from the college library. Principles from Introductory Physical Science (IPS) also made a part of the course content.

304 Science for Elementary School Teachers

Materials: Several selected kits from Science Curriculum Improvement Study (SCIS) were purchased and used as laboratory activities.

Texts: Selective manuals from SCIS, ESS and AAAS, with the overwhelming majority taken from SCIS and ESS.

General: Materials, which are now housed in the Director's office, but will become a part of the Science Resource Center, September 1972. Additional references were required from the college library.

These above students, listed under Participants, received the E. I. Du Pont De Nemours & Company scholarships under the UPSTEP program in the amount of $400 each.

The previously mentioned courses also serve as supporting courses to other majors (especially Elementary Education). As a result, the following number of additional students were taught:

Fall Semester, 1971

201 Physical Science Survey
Students taught: 81

304 Science for Elementary School Teachers
Students taught: 46

Spring Semester, 1972

201 Physical Science Survey
Students taught: 59

304 Science for Elementary School Teachers
Students taught: 35

Methods of Recruiting

Beginning with the 1971-72 school year, printed brochures were sent to all high schools in Kent and Sussex Counties and certain selective high schools in New Castle County. These announcements were followed by visits from the Director of the Program to several of the high schools, talking with principals, counsellors and graduating students. Through the Public Relations Department at Delaware State College, announcements were made through the following media: newspaper and radio. Contacts were made last spring with all freshmen at Delaware State College who were registered under the heading of "undecided majors".

Getting students to major in science education is a slow process; however, the future looks bright. From time to time, progress reports are received from other colleges who also have the UPSTEP program. These colleges are located in several states. Their enrollment far exceeds that of Delaware State College, yet, after the UPSTEP program has been instituted in some of these colleges for three years, their major enrollments average around twenty students.

Among some differences of the UPSTEP program from other regular science education programs, one in particular is that the UPSTEP program is classroom centered, in that students gain practical experience in classroom situations with actual teachers, beginning with the junior year and extending through graduation.

Feedback from the principals showed that a few of them objected to having students enter their classrooms before the last semester of their senior year - on the basis that these students would be ill-prepared in science at this stage to make any contribution to the class, and, as a result, would serve as liabilities rather than assets to the progress of the class. Had this situation remained, one of the primary objectives of the UPSTEP program would have been blocked.

After discussion with the superintendent, supervisors of the elementary and middle schools, and certain principals and teachers of the Capital School District, agreement was reached to permit the Director to conduct demonstration lessons from Science Curriculum Improvement Study (SCIS) to the 2nd and 5th grades at Hartly Elementary School, and to the 6th grade at William Henry Middle School, and Intermediate Science Curriculum Study (ISCS) to the 7th grade at William Henry Middle School, and to the 8th grade at Central Middle School. These efforts were well received at all schools, as evidenced by parent inquiry and willingness of the administrators to purchase materials and supplies.

The teachers were selected on a voluntary basis. Many of them were hesitant to venture into programs that had subject-matter content drawn from the physical sciences. They preferred biological sciences. As a result, the science programs taught by the Director are the ones from which the content materials are drawn directly from the physical sciences disciplines. For example, the 2nd grade pupils at Hartly Elementary School were exposed to Material Objects and Interaction Systems from SCIS. The 5th grade pupils were exposed to Energy Sources and Environments from SCIS. At the William Henry Middle School, the 6th graders were involved with the SCIS Materials on Environments and Energy Sources, and the 7th graders worked with principles drawn directly from the discipline of physics

(ISCS, Level I). At Central Middle School, the 8th graders were involved with the principles drawn directly from the discipline of chemistry (ISCS, Level 2).

Summary information concerning schools, teachers and students participating in the ISCS and SCIS program introduced into the three Capital School District schools, 1971-72:

(a) School: Dover Central Middle School
Teacher: Mr. Frank Gieski
Students: One section of 32 students (8th grade) participating in Level II of Intermediate Science Curriculum Study (ISCS).

(b) School: William Henry Middle School
Teacher: Mr. Lionel B. Caynon
Students: Two sections of 68 students (7th grade) participating in Level I of Intermediate Science Curriculum Study (ISCS).

Teacher: Miss Frances A. Czaplicki
Students: Two sections of 67 students (5th grade) participating in Science Curriculum Improvement Study (SCIS).

(c) School: Hartly Elementary School
Teacher: Mrs. Annie F. Ricks
Students: Two sections of 67 students (5th grade) participating in Science Curriculum Improvement Study (SCIS).

Teacher: Mrs. Pamela Simpson
Students: One section of 28 students (2nd grade) participating in Science Curriculum Improvement Study (SCIS).

On a weekly basis, the Director of the UPSTEP program spent the approximate time at the three public schools, as follows:

Central Middle School - 3 hours
William Henry Middle School - 5-6 hours
Hartly Elementary School - 5-6 hours

As stated above, the UPSTEP program is a classroom centered program and students enter the classrooms of the public schools, beginning with their junior year, to gain practical experience in classroom situations with actual teachers. Many inservice teachers needed to be retrained in order to provide a nucleus of trained cooperating teachers - thus the reason for providing the pilot program in the three public schools.

Our Science Education Program here incorporates several of the newer Science Curricular Developments in Science Education. The overwhelming majority of the inservice teachers received their degrees before these newer Science Curricular Developments came on the scene.

Financial Summary

UPSTEP

The funds for this program were granted by NSF prior to inception of Del Mod System.

DEL MOD SYSTEM

OBSERVABLE TRENDS IN SCIENCE EDUCATION

Observable Trends in Science Education

As a result of one year of operation several trends have become manifest. It is conceivable that these trends portend the picture of inservice education in science teaching in the future and will undoubtedly color the type of pre-service training students will receive at the University of Delaware and Delaware State College.

Probably one of the most clearly discernible trends is the content need which should be quite clear in about three years. For the past year the emphasis on inservice teacher training has been on the development of the teaching strategies necessary for the new science curricula. As teachers experiment with different teaching methods their confidence in their ability to perform differently increases. With increased confidence the desire to learn more about the general field of science appears; however, the type of additional content sought seems to be that of recent developments in research and introductory courses in fields which are missing from their undergraduate program.

Keen interest is also appearing for any research or content related to the local area i.e. Delaware, local flora and fauna, physical aspects of Delaware, the Delaware coast and others. The excitement also seems to embrace to a lesser degree other local research at the University and in industry.

Equally apparent is the trend in follow-up activities which succeeds the initial year of involvement in a Field Agent program. At the middle school/junior high school level, once teachers are exposed to an extended experience in new methods and materials, they begin to see the sequential nature of present program offerings and the need to work together as a faculty to maximize their new skills. The transition is not rapid but seems to require, between training and implementation, the intermediate step of writing contiguous performance objectives. This in itself is a learning process and further stimulates the total science faculty as a total entity rather than each teacher doing his own "thing".

At the elementary level after teachers have experienced success in their own right with any aspect of science, there appears to be an interest and willingness to consider elementary science programs. Prior to successful encounters in science a fear of science exists which makes the implementation of current elementary programs an unsatisfactory event and almost impossible. The follow-up activities for elementary teachers after a year of success tend toward in-depth study of particular programs coupled with real classroom trials. Following these trials teachers are making their own adaptations rather than total adaptations of programs.

Another very noticeable trend is that improvement of one discipline has begotten the improvement of another closely related area.

The improvement of science education has stimulated the improvement of math education. Math and science teachers are beginning to meet and talk with each other about mutual problems and the mathematics community of the state is organizing as a system. It appears that the secret to tangential stimulation is the involvement of a total faculty in a school as opposed to isolated teacher involvement. This also seems more apparent in a more highly structured discipline such as mathematics rather than the social sciences.

There are indications that as a result of work of a period of time the secondary science and math teachers may see the existent interrelationships and move to a team situation. There seems to be more tendency to make a team effort in the junior high school and middle school than in the high school. On the other hand there is a strong move on the part of the self-contained elementary teacher to think of math and science concepts as interrelated. The math-lab approach and such programs as S-APA have had great influence in bringing the merger about.

Lastly, a trend which is not new, but much more manifest than in past years, is the tendency for experienced teachers who have been former NSF, USOE, or other institute participants to develop their own versions of programs. This process seems to be accelerated by the presence of Del Mod and its willingness to get groups together for general discussion. Once a teacher develops his own version of one of the new curricula these modifications become a fixed part of his classroom repertoire and remain without additional support.

THE FIRST YEAR

DIRECTOR'S COMMENTS

The Del Mod System has completed its first year of operation. There have been numerous successes, some failures and other problems which are still with us. But, by and large, the first year has been an exploratory one with many ideas proffered, some rejected and still others put into action.

Three major factors are responsible for the success of the Del Mod System in its first full year--quick communication between Del Mod and the schools, grass-roots input from the schools with definition of their needs, and quick attention to the defined needs by either the Del Mod staff or its component institutions.

Within the observation of the writer, several factors seem to be responsible for bringing about the establishment of a quick communication system. Quick communication is based on person-to-person conversations as opposed to cold, impersonally written letters and notices. It is also built on periodic as well as impromptu discussions with all personnel connected directly or indirectly to the Del Mod System; Component Coordinators in each of the participating institutions, Field Agents, Research Associates, and Project Directors.

The Del Mod System has taken advantage of the demographic structure to build its communication system. Prior to Del Mod, communication did not take place readily among science education personnel. The office of the Del Mod Director presently serves as a clearinghouse with sub-centers in each component institution. From careful observation of Del Mod and study of what has happened in Delaware, several conclusions are being drawn which may serve as guidelines for development of similar approaches elsewhere.

1. The type of system existent in Delaware depends on a well-defined communications network.
2. This network seems to function well in an area with a population under one million. Beyond this limit the type of system Delaware has may not be feasible.
3. The systems approach seems to function best when there is a natural cohesion in the population. Such cohesion appears to occur as a result of a relatively stable population or a growing population with a stable core, a geographic confinement, or a natural thread or tie which unites the population. Such threads might be religion, mores, occupations or ethnic backgrounds.

The Del Mod communications system is working to provide feedback and prompt action because it is built on three factors: the natural composition of the state, personnel who constantly build bridges to solidify and strengthen the natural flow, and staff members attuned to the value of personal interaction.

The value of grass-roots input is not to be minimized. In the past, persons at decision-making levels have decided what kinds of programs and content teachers needed and proceeded to design appropriate curricula and courses. At that time these courses and programs did provide the stimulus for increased science involvement. Limited emphases were placed on the strategies needed to impart the new curricula or content to the students. As a result of the aforesaid activities many teachers were not prepared to adapt materials to their local needs or to attack locally defined problems.

The Del Mod System has relied heavily on what teachers and schools say they need as opposed to telling the school what they should be doing. In most cases these needs involve study of new science proposals and adaptation or takeoff for local use on some of the nationally developed programs. These needs are made apparent to the Del Mod staff through the Field Agents, local supervisors, personal contacts, and informal communication. Often the resultant proposals are strikingly similar in character and scope and all have several things in common:

1. They originate at the local level and indicate broad involvement.
2. They are supported by documentation of the need.
3. They are ranked in priority order at the local level.
4. They carry local district commitment in time, money, and/or personnel.

On the surface it may appear redundant to conduct or support similar programs in nearby districts; however, actual practice has shown that local commitment and pride in carrying out an idea is 90 percent of the battle of implementation. The philosophy has been adopted by the Del Mod staff that it is unnecessary to reinvent the wheel but everyone should learn to build one.

Not all local districts are able to define their needs although many are willing to ask for help. A variety of reasons explain this inability at the building or district level. Among the more common explanations are inertia, lack of exposure to new ideas, provincialism, personalitites of individual teachers, lack of administrator concern, and fear of failure. When such conditions are found to exist, the Del Mod Research Director prepares from his data bank a district or building profile. This profile, coupled with subjective impressions from the Del Mod staff, are developed into several alternate pathways which the teachers or administrators may choose to follow. In most cases the plan builds on the resources already available in the district or school.

After the decision is made the Del Mod staff, jointly with the district school and/or teachers, decides which institution can best satisfy the chosen course. Sometimes this is resolved at the higher education level; at other times at the Field Agent level; and still others by training a local person to function as a resource person. In some districts, Field Agent support and training of a resource person are offered concurrently.

At this point it should be pointed out the necessity for statistical and research data as a basis for making decisions. The use of these data for those districts which ask for assistance in determining their needs has been discussed. This concept cannot be stressed enough because even in the more aggressive and sophisticated districts these data are used as a basis for joint planning, staffing, evaluation design, program direction and utilization of the existing resources, both local and other federally supported ones.

Grass-roots involvement of the type described above doesn't happen accidentally. It has to be worked at and cultivated. Without such input any kind of program will receive only cursory attention. It will not involve the large numbers of people who are necessary to cause a noticeable change no matter how good your original model or design may be. Once a plan is worked out with a local group, support in both funds and personnel, will be sustained over about three years. The emphasis and kind of program may change, but contact with individuals will be retained until, in the judgment of the staff and school, it is unneeded.

The communications network previously described accounts for part of the success in fostering grass-roots input. The other part rests with personnel who are patient, understanding and who believe that the little things teachers say are important. Without this trust and confidence in the Del Mod personnel the grass-roots input might be minimal and the residual impact would be lost.

Quick communication and grass-roots input are essential ingredients in the system; however, they would be ineffective in themselves if prompt action were not taken on the stated needs of the teachers and schools. While any project has to have an overall program outline, flexibility to change direction, hire appropriate staff, and respond quickly is vital. Teachers, like most people, usually sustain enthusiasm and interest for relatively short periods of time. If the time lag between proposal submission and funding is too long the interest wanes and so does the program. Likewise, if a condition arises within a program which merits a complete change of direction or a somewhat different slant than the original, this too must be acted upon speedily. It also goes without stating that unplanned situations may arise which necessitate encouragement of the spark of interest if the following year is to have an effect. Delay of action in these cases could negate any further progress.

Several elements contribute to the flexibility which is needed to maximize the grass-roots input and the communication network. The Del Mod System attributes its ability to respond rapidly to:

1. A source of funds from private sources (the Du Pont Company, Hercules Company, private foundations, etc.) which permits activities not normally covered by National Science Foundation or other federal funds.

2. Signature control for disbursement of funds in the hands of the component coordinators and the Del Mod Director.

3. The support and commitment of the institutions' heads which permit and allow this flexibility plus their confidence in the staff to make such decisions.

4. The budgeting procedures within National Science Foundation which treat systems grants as one large grant as opposed to many small grants.

The Del Mod System has made progress, but it is no panacea for revolutionizing and curing all the ills of science education. Certain things have been learned as a result of the efforts to build up communication, grass-roots input and prompt action.

1. There are degrees of success for various projects. Not all teachers, schools, or administrators have the same amount of commitment, expertise, or resources to devote to solving their problems. A small amount of progress is all that can be expected in some cases. This amount of progress is significant in that it was made; therefore, it is a beginning.

2. If careful planning is done, available data are used for decision making, existing physical resources are used to carry out the project, and there is constant communication, then a better product can be expected. Funds expended can be more readily accounted for.

3. Not all schools or teachers are anxious to change or even welcome an opportunity to try new things. To foster change in these cases a tremendous task of selling and convincing has to be performed. This takes constant contact, long hours, time for the idea to mature in the teachers' minds and the impression left that you are sincere and capable of performing the task.

4. If something is promised it must be delivered. One renege or breach of faith closes a school's door to the seller.

5. Solution of teacher- and school-defined problems is a continuous process. When teachers have met one need, they uncover more needs; however, they may be better able to attack newly discovered needs than they were to discharge the first.

The model originally proposed for the Del Mod System has been made to work. Several alterations have had to be made in the model to fit real situations since few models account for the wide variances in individuals, schools, and institutions. The actual application of the model is not easy. It requires hard work, a dedicated staff which in itself possesses strength but is malleable to individual situations, common understanding of purpose, and a keen assessment of reality as a foundation to build what is needed for a given situation.

APPENDIX

LISTING
OF
DEL MOD PROJECTS
BY
NAME AND NUMBER

Listing of Del Mod Projects By Project Number and Name

71-1 University of Delaware - Physical Science 1971 Summer Project
71-2 University of Delaware - Population-Environment Curriculum Study
71-3 University of Delaware - Marine Environment Curriculum Study
71-4 Newark School District - Auto-Tutorial Project
71-5 Wilmington Middle School Science Teacher Project
71-6 University of Delaware - Marine Environment Curriculum Study
71-7 Upper Elementary Project - Kent and Sussex Counties
71-8 Eastern New Castle County - Junior High School/Middle School Project
71-9 Department of Public Instruction - Primary School Teachers Science/Mathematics Workshop (Kent County)
71-10 Alfred I. duPont School District - Evening Laboratory Program
71-11 Department of Public Instruction - Primary Science Inservice-Ecology Project (New Castle Gunning-Bedford School District)
71-12 St. Mark's High School - Focus Program
71-13 Stanton School District - Model for Articulation
71-14 Alexis I. duPont School District - Environmental Education
71-15 University of Delaware - Physical Science Inservice Project
71-16 University of Delaware - Madison Project Elementary Mathematics Program
71-17 Department of Public Instruction - Primary School Teachers Science/Mathematics K-3 Workshop (Marshallton-McKean District)
71-18 Junior High/Middle School Science Teachers Follow-Up Program on the 1970-71 Field Agent Program (Kent and Sussex Counties)
71-19 Marshallton-McKean School District - Physical Science for Primary Teachers
71-20 Computer Programs for Chemistry Experiments (Individual Teacher Program)
71-21 Development of Modules for Instruction of Elementary Teachers in the Concept of Physical Science (Individual Teacher Program)
71-22 Spring Marine Curriculum Study
71-23 University of Delaware - Leadership Training
71-24 Delaware State College - UPSTEP
71-25 University of Delaware - Physical Science Inservice Project

LISTING
OF
INDIVIDUAL PROJECTS
AND
NAMES OF PARTICIPANTS

71-25 DR. YOLLES, DIRECTOR N=21

DONALD BARROW		C241 68 7477	71-25	
GEORGE S. BURNS		C222 22 2810	71-25	
GARY E. DUNKLEBERGER		G184 38 6032	71-1 71-1571-25	
RONALD ESHLEMAN		C187 32 6421	71-1571-2572-14	
PETER FERRARIO, JR.		164 40 5294	71-25	
SISTER MAURA ANNE FREDRICK		073 34 9514	71-8 71-25	
MICHAEL P. GREEN		P167 38 8339	71-1 71-1571-25	
ELDON K. HAMRICK		G233 64 5283	71-1 71-1571-25	ON LEAVE
MRS. JAN B. KIRK		B261 82 6987	71-1571-25	
KEITH MC KAIN		E172 36 8307	71-25	
MRS. CAROLYN CLARK NEWSOM		G222 30 6022	71-25	
CYNTHIA NOLAN		144-38-1884	71-1 71-1571-25	
BRUCE PARSONS		G240 62 4230	71-1571-25	
PAUL POMEROY		166 38 1017	71-25	
MRS. JACQUELINE ROOT		578-12-4277	70-1 71-25	TITLE III
DR. JOSEPH RYAN		477 30 4078	71-1 71-1571-25	
MRS. BETTY SCOTT		C170 30 9871	71-1571-25	
DR. MICHAEL STEMNISKI		G184 32 2910	71-1 71-1571-2371-25	
LOUIS J. TENTROMONO		G178 36 0831	71-1571-25	
PHILIP VAVALA		222 32 9487	71-1571-2572-14	
MRS. MARGARET W. WEBB	CARD 1	L157 34 3298	71-1 71-8 71-1571-23	CONT.
MRS. MARGARET W. WEBB	CARD 2	L157 34 3298	71-25	INACTIVE

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 71-1 DR. YOLLES, DIRECTOR                       |                         N=30
LEE D. ANDERS                          G187 30 3742|71-1
JACK BAKER                             E176 36 7357|70-1 71-1
CARL BOYD                              C169 38 0225|70-1 71-1
RICHARD BURKHOLDER                      192-30-1536|71-1
MRS. CHI HSIA CHAO                     C160-36-5341|71-1
MRS. MAIRA DE LA CUESTA                G221 20 5888|71-1 71-8 71-15 ALSO MATH
GARY E. DUNKLEBERGER                   G184 38 6032|71-1 71-1571-25
MRS. JANICE J. GEBHART                 G146 36 5263|71-1                INACTIVE
MICHAEL P. GREEN                       P167 38 8339|71-1 71-1571-25
CAROLYN HAAS                           P175 40 3170|71-1 71-15
ELDON K. HAMRICK                       G233 64 5283|71-1 71-1571-25  ON LEAVE
JOHN HEINZ                              142-36-3063|71-1
CARL HILL                               430 80 0146|71-1                RESIGNED
JOHN IGNATIEFF                         C152 34 5336|71-1 71-15
WILLIAM KEAY                            202 28 5258|71-1 71-15
FRANK S. LUXL               CARD 1     C219-62-9929|71-1 71-2 71-1572-10CONT.
FRANK S. LUXL               CARD 2     C219-62-9929|72-1772-24
JOSEPH R. MAXWELL, JR.                 C179 34 9707|71-1 71-15
HERBERT W. MITCHELL                    C018 12 2818|71-1
MRS. VELTA NICKERSON                    221 22 7376|71-1 71-15          INACTIVE
CYNTHIA NOLAN                           144-38-1884|71-1 71-1571-25
MARY FRANCES O CONNOR                  G235 62 3104|71-1 71-15
DR. JOSEPH RYAN                         477 30 4078|71-1 71-1571-25
RONALD SELWOOD                         C163 34 9661|71-1
WILLIAM SOKOL                          C183-32-0395|71-1 71-4 72-9
DR. MICHAEL STEMNISKI                  G184 32 2910|71-1 71-1571-2371-25
LARRY VARON                             159-38-7501|71-1
MRS. MARGARET W. WEBB       CARD 1     L157 34 3298|71-1 71-8 71-1571-23CONT.
MRS. MARGARET W. WEBB       CARD 2     L157 34 3298|71-25               INACTIVE
MRS. JEANETTE R. WIXTED                G137 38 4265|71-1                INACTIVE
JOHN E. YANAITIS                       C208 30 2502|71-1
WILLIAM ZEHNER                          072-14-3493|71-1
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71-2 DR. STEGNER, DIRECTOR N=30

JAMES ANDREWS		C199 14 9475	71-2 71-10	
LAWRENCE BOZZOMO		194-34-8865	71-2	
CLIFFORD BROWN		120 14 7528	71-2	
RUTH ANN BURTON		118 20 6848	71-2	
OLIVER CRICHTON		009 05 7088	71-2	
TIMOTHY LEE DAWSON		164-36-3590	71-2	LANGUAGE
HARRY J. DILLNER		B160 34 6836	71-2 71-4	
MRS. MARILYN DRAYER		064-36-6655	71-2	
ROBERT M. EDWARDS		178-36-3222	71-2	SOC.ST.
JAMES FLEMING		B173 34 7617	71-2	
MRS. JANELLE HEUBERGER		222 32 4150	71-2	
MRS. KAROL LYNN HITCHENS		222 20 1107	71-2	SOC.ST.
HARRY KREIDER		G195 32 0318	71-2	
ROBERT LEWIS		E207 26 3637	71-2	
ROBERT LOYND		205 26 3014	71-2	
FRANK S. LUXL	CARD 1	C219-62-9929	71-1 71-2 71-1572-10	CONT.
FRANK S. LUXL	CARD 2	C219-62-9929	72-1772-24	
MRS. SUZANNE MC CANN		222 28 0391	71-2 71-8	ALSO MATH
JOHN MC DERMOTT		185 26 3350	71-2 71-16	
MRS. ANNE MURRAY		222 28 1605	71-2	CHILD CARE
JOYCE PEACO		222 26 6899	71-2	
CHARLES F. PLATZ		177-20-4376	71-2	ART
BEN POLLOCK		159 36 0549	71-2	
JOHN C. ROGGE		G362 34 3596	71-2	
DAVID RUTH		205-30-5855	71-2	SOC.ST.
EDWARD SKUDLAREK		104-22-3740	71-2	
RICHARD SNYDER		221-26-2271	71-2	INACTIVE
MRS. PATRICIA STETSON		127 34 1909	71-2	INACTIVE
FRANKLYN SYKES		G268 16 8221	71-2	
MRS. DEBORAH WHEATCRAFT		155 36 0221	71-2	
THEODORE WILEY		236-64-6681	71-2	SOC.ST.

71-3 DR. SCHWEITZER, DIRECTOR N=18

TERRY H. ALLEN	222 26 6849	71-3
MRS. PATRICIA BATHON	214 24 1992	71-3
FRANK CANNON, JR.	222-30-3564	71-3
PHILIP CAPRIOTTI	222 16 2434	71-3
WILLIAM M. CONLEY	221 30 2135	71-3
ALFRED DI EMEDIO	221 28 3160	71-3 71-1272-7
MRS. HARRIETT DONOFRIO	G216 48 5976	70-1 71-3 71-18
MRS. GWENDOLYN GUERKE	221 30 3573	71-3
ROSEMARIE K. MASON	221-34-2471	71-3
MRS. ELSIE MURRAY	222 30 8276	71-3
LEONARD NAVITSKY	175 38 7770	71-3
MAX NEWBER	B246 40 0836	71-3
SCOTT NICODEMUS	167 38 3340	71-3
MRS. HELEN RICHARDSON	411-24-1807	71-3
ROBERT D. RINEHART	G235 46 4409	71-3 71-8
MRS. NANCY ROCHELEAU	182-38-3948	71-3
DAVID SNOW	B006 09 2561	71-3
DAVID WILLIAMS	B221 22 9178	71-3

71-4 CATHERINE Y. BONNEY, DIRECTOR N=12

MRS. SHARON ALLEN	G171 34 6707	71-4	
MRS. CATHERINE Y. BONNEY	222 22 3451	71-4	SCI. SUPV.
MRS. GEORGIA CRESSMAN	201 40 9944	71-4	
KENT DARLINGTON	195 32 8987	71-4	
HARRY J. DILLNER	B160 34 6836	71-2 71-4	
DANIEL T. FRENCH	028 32 1272	71-4	
PAUL D. HARDING	B200 24 9667	71-4	DECEASED
MRS. PAULA S. HENDERSON	B142 40 0576	71-4	ON LEAVE
WILLIAM T. JOHNSTONE, JR.	B290 38 3670	71-4	
MRS. DIANE L. SISK	G178 36 4234	71-4 72-9	
WILLIAM SOKOL	C183-32-0395	71-1 71-4 72-9	
MRS. NANCY SULLIVAN	222 32 2421	71-4	

71-5 LORETTA CLARK, DIRECTOR N=15

MRS. LUCINDA FAUNTLEROY	G402-32-9475	71-5	
DONALD HAMAN	222 28 6699	71-5	
C. PORTFIELD HARRIS	G228 18 0430	71-5	
FRED T. JOHNSON	G221 14 0421	71-5	
MRS. JEANNE Q. LEWIS	G221 18 3013	71-5	72-3
CLARENCE MC LAURIN	198 30 4005	71-5	72-3
PARKER MC MULLEN	G222 30 4605	71-5	72-3
CHARLES E. MICHAEL	G237 64 4209	71-5	
WALTER NAPIER	G221 22 7705	71-5	
PAUL D. RAMSEUR	G171 76 7447	71-5	
MRS. POLLY WEGNER RIDDLE	266-72-8299	71-5	72-3
WILLIAM TIMM	G164 36 2224	71-5	72-14
MRS. INA WHITE	G241 72 9389	71-5	72-3
MRS. EVA B. YORK	G221 16 0232	71-5	
MRS. GRETA YORKMAN	221 22 4531	71-5	72-3

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 71-6 MAURA GEENS, DIRECTOR                                            N=29
DENNIS BANKS                      G221 26 266770-1 71-6 71-1871-2272-1
RALPH BATTAGLINO                  G222 32 001070-1 71-6 71-1871-22
BELASCO BOSSARD                   G247 48 508070-1 71-6 71-18
MRS. MARY J. COLLIER              G223 36 295670-1 71-6 71-18
FRANCES ANNE CZAPLICKI             222 34 9551           SEE MACIARELLO
WILLIAM L. DIXON                  G274 38 936171-6 71-22        RESIGNED
JOHN S. DRAGER                    B211 34 496671-6 71-22
FRANK GIESKE                      G233 78 052670-1 71-6 71-18
MITCHELL B. GORDON, JR.   CARD 1  G233 66 150170-1 71-6 71-1871-23CONT.
MITCHELL B. GORDON, JR.   CARD 2  G233 66 150172-1 72-8
WILLIAM R. HALL, JR.              G198-34-380071-6 71-22
DEAN HINZMAN                      G227 42 414270-1 71-6 71-18
CHARLES JOSEPHSON                 G065 30 827570-1 71-6 71-18
ALEXANDER KANSAK                   221 16 102270-1 71-6 71-1871-22
WALTER JOHN LAYTON, JR.   CARD 1  B221 28 134670-1 71-6 71-1871-22CONT.
WALTER JOHN LAYTON, JR.   CARD 2  B221 28 134671-2372-1 72-8
JAMES E. LONG                     L233 62 719670-1 71-6 71-1871-2272-8
MRS. FRANCES C. MACIARELLO         222 34 955171-6 71-22
JOHN MACIARELLO                    222 30 306471-6 71-7 71-22
MRS. PATRICIA MC BATH              266 68 474871-6             INACTIVE
ROBERT MILLER                     G201 24 454570-1 71-6 71-1871-22
THOMAS MILSPAW                    G221 28 901170-1 71-6 71-1871-2271-23
JOHN OSTERHOLM                    E222 30 760070-1 71-6 71-18
MRS. VERNA PRICE                  L173 24 046170-1 71-6 71-1872-8
VLADIMIR RADNOVIC         CARD 1  G222 34 169370-1 71-6 71-1371-18CONT.
VLADIMIR RADNOVIC         CARD 2  G222 34 169371-22           INACTIVE.
JOHN REIHER, STATE SCI. SUPV.      144-28-424971-6
WAYNE E. RIGBY                    P221-30-895171-6
CHARLES R. STEIN                  G222 14 649070-1 71-6 71-1872-1 72-12
MRS. MARY L. STEIN                C478 32 195571-6 72-6        INACTIVE
MRS. MARY JOAN THOMAS             L165 32 338171-6
CHARLES H. WEBB                   B222 26 323171-6 71-22
CLARENCE ELLIOT WORKMAN           G222 28 760570-1 71-6 71-1871-22
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71-7 JAMES GUSSETT, FIELD AGENT, DIRECTOR N=60

MRS. VIRGINIA ARNDT	049 34 6411	71-7			
MRS. SUSAN BASILE	155 38 5924	71-7			
JOSEPH BEDFORD, SR.	221-10-6468	71-7			
MRS. LINDA BLOW	221 28 8404	71-7			
MRS. BARBARA BOURASSA	144 26 0211	71-7			
EDWARD BRUCHAK	171 30 8648	71-7			ASSOC. PRIN.
FRED BRUNSON	265 56 4091	71-7			
LUIGI CAPORASO	169 36 4493	71-7			
MRS. ANN CHAMBERS	222 20 7102	71-7			
MRS. ROSALIE CLINE	578 34 4877	71-7			
MRS. PEGGY COYLE	222 32 4718	71-7			
ROBERT CRAIG	G302 38 5545	71-7	71-22		PRINCIPAL
GRACE ANN CRESS	221 36 7487	71-7			
FRED W. DEWEY, JR.	221 28 9451	71-7			
MRS. BETSY DOMKE	231 14 7100	71-7			
MRS. ETHEL ELLINGSWORTH	221 28 2425	71-7			
ROBERT ERNE	199 18 9489	71-7			
SARA FARR	143 40 9266	71-7			
MRS. JANET FOLTZ	221 34 7667	71-7			
SUZANNE FORESMAN	221 34 2652	71-7			
MRS. BARBARA FOWLER	062 28 8700	71-7			
MRS. DELORES FREEMAN	219 36 7012	71-7			
MRS. BARBARA FRIEND	221 30 2366	71-7			
MRS. DOROTHY GIBSON	221 18 0666	71-7			
BILL GOLDSBOROUGH	222 22 4843	71-7			
VERNON HALL	221 28 9815	71-7			
MRS. SARAH HERSTER	221 28 8812	71-7			
MRS. SHERRI HUNTZINGER	125 40 5439	71-7			
WALTER JACOBS	173 34 5513	71-7			
NOWELL JONES	016 22 6865	71-7			
CONSTANCE KELLEY	174 36 4464	71-7			
MRS. LOUISE KING	222 24 4468	71-7			
LARRY KOPPENHAVER	171 28 4186	71-7			MATH SUPV.
WILLIAM LAUR	120 26 6708	71-7			
MRS. MARTHA LITTLE	150 07 9176	71-7			
JOHN MACIARELLO	222 30 3064	71-6	71-7	71-22	
SALVATORE MADRESCHESIA	153 20 2033	71-7			
MRS. NANCY MASTEN	211 36 0538	71-7			
ROBERT MAULL	222 18 4481	71-7			
MRS. THELMA MILLER	162 24 3461	71-7			
LELAND MILSPAW	199 10 5164	71-7			
MRS. GRACE MURRAY	221 26 9717	71-7			
DAVID RAZANNO	192 38 4896	71-7	71-22		
MRS. MARGARET SHAW	220 52 8355	71-7			
BARBARA SMILSKI	136-38-2882	71-7			INACTIVE
MRS. DIANE SMITH	219 42 9017	71-7			
PAULETTE SMITH	221 28 2416				SEE TINDALL
MRS. LOUISE SPICHER	215 20 4651	71-7			
JAMES STARLING	222 24 2854	71-7			
ALPHONSO STEVENSON	161-16-0650	71-7			
KAREN SWETIC	222 36 7901	71-7			
MRS. KATHLEEN THELEN	472 58 1163	71-7			
MRS. PAULETTE SMITH TINDALL	221 28 2416	71-7			
MRS. CINDY TRUAX	221 38 1968	71-7			
ROBERT VAN HORN	196 36 5930	71-7			

MRS. PATRICIA VOGLER	236 44 6165	71-7
WAYNE WHALEY	222 32 3013	71-7
JAMES WILLIAMS	222 16 4855	71-7
CECIL WILSON	189 32 0109	71-7
DAVID WINSKI	198 34 0175	71-7
DONALD ZIMMER	276 24 8957	71-7

71-8 BARBARA LOGAN, FIELD AGENT, DIRECTOR N=60

GLORIA ALUISE	222 34 3701	71-8 71-23	
VETO ALUISE	221 03 2819	71-8	
MRS. ERMA K. BOYER	G222 16 9322	71-8	
SISTER ROSE BRAUDIS	015 30 4493	71-8	
MRS. AZALIA BRIGGS	229 30 5188		SEE WILSON
MRS. JANIS CAMP	222 30 0035	71-8	
JOYCE CAREY	221 28 7740	71-8	
EDWARD CASEY	G234 44 0083	71-8 72-7 72-10	
LEO F. CONWAY	204 36 0487	71-8	
MRS. MAIRA DE LA CUESTA	G221 20 5888	71-1 71-8 71-15	ALSO MATH
JOANN DELL AVERSANO	221 32 6679	71-8	
PAUL J. DOUGHERTY	222 22 9294	71-8	
BETTY DUFFY	222 20 8032	71-8	
ROBERT FIORAVANTI	221 28 4174	71-8	
TERENCE FITZPATRICK	222-32-0910	71-8	
SISTER MAURA ANNE FREDRICK	073 34 9514	71-8 71-25	
SISTER IRENE THERESA GALLAGHER	266 06 0799	70-1 71-8	INACTIVE
FRANCIS GAVAS	B207 16 4347	71-8 72-10	
SISTER NANCY HANSON	220 42 9575	71-8	
GARY HENDERSON	G207 26 6285	71-8	
SISTER MURIEL DE LOURDES HIGGINS	185 44 8976	71-8	INACTIVE
FRANK G. HUTTON	B296 40 1842	71-8 71-2372-7	
WILLIAM JOHNSON	G221 24 6851	71-8	
MRS. SALLY KEHOE	221 26 0456	71-8 71-23	INACTIVE
JOHN KINSLER	G222 28 5916	71-8	
SISTER ANNA MARIE KROENUNG	221 38 6202	71-8	
MRS. ELIZABETH LIPKA	718 03 2681	71-8	
KENNETH MACLARY	G222 28 1350	71-8	
LARRY MAURER	205 36 4875	71-8	
MRS. SUZANNE MC CANN	222 28 0391	71-2 71-8	ALSO MATH
BROTHER THOMAS MEANY	044 32 1160	71-8	
RUSSEL MEREDITH	G172 36 9554	71-8 72-10	
CHARLES A. MILLER, III.	G222 24 0088	71-8	
GEORGE W. MITCHAM	G233 34 8271	71-8	
SISTER MARY MARTHA MURAWINSKI	154 32 3086	71-8	
ALVYN I. NACMAN	062 24 2178	71-8 72-7	
SISTER MARY MICHAEL OSTATKIEWICZ	040 44 4907	71-8	
MRS. KLARA PASQUINO	222 24 3856	71-8	
MRS. JANET PHILLIPS	G187 32 8440	71-8	
ROBERT N. PHILLIPS	G181 32 9318	71-8	
MRS. MARY S. PRATT	G254 26 5115	71-8 71-23	
MRS. EDITH RAGON	454 48 1954	71-8	
LOUIS RECLA	207 24 6331	71-8 72-7	
SUSAN S. RICE	222 30 1462	71-8	
ROBERT D. RINEHART	G235 46 4409	71-3 71-8	
WILLIAM SAXTON	538 42 3076	71-8	
ROBERT SHALVEY	G235 20 3370	71-8	
THOMAS F. SHAW	G185 28 9791	71-8	
JOSEPH J. STAFFORD, JR.	E195 36 5114	71-8	
MRS. VIRGINIA STAFFORD	206 36 3291	71-8 71-23	
MRS. MILDRED SWINDLER	205 20 8312	71-8	
ANDORA SZOT	171 32 3743	71-8	
RITSA TAGAMATARKES	222 38 0238	71-8	
SISTER URSALA TISDALL	217 58 9619	71-8 72-10	
SISTER MARY IVANA TROY	176 42 8102	71-8	

SISTER ROSE VATTILANA		221 18 7543	71-8	
DIANE VICOREK		221 34 6014	71-8	
LINDA WALUKEWICZ		057 40 0982		SEE WEDDLE
MRS. MARGARET W. WEBB	CARD 1	L157 34 3298	71-1 71-8 71-1571-23	CONT.
MRS. MARGARET W. WEBB	CARD 2	L157 34 3298	71-25	INACTIVE
MRS. LINDA WALUKEWICZ WEDDLE		057-40-0982	71-8	
SAMUEL WILSON		247 68 1884	71-8	
MRS. SANDRA K. WOLFORD		G287 32 2448	71-8 72-7	

71-9 JOHN REIHER, DIRECTOR N=32

MRS. SUZANNE BAXTER		71-9		
MRS. DARLENE BOLIG	178 34 6280	71-9		ELEMENTARY SUPV.
MRS. IRENE BOURNE	034 28 8790	71-9		
MRS. RUTH CHUBATY	015 20 6543	71-9		
MRS. EUGENIA CLENDANIEL	242 34 0544	71-9		
VERONICA COLEMAN	141 20 2885	71-9		
MRS. GLADYS CONNOR	043 20 8307	71-9		
MRS. JOANNE COVEY	142 34 2347	71-9		
MRS. MARY DECKER	153 22 7368	71-9		
SUSAN DOUGLAS	433 70 6618	71-9		
MRS. PAMELA DUKE	549 64 4387	71-9		
MRS. KAY ECKSTORM	095 14 7316	71-9		
MRS. BERNICE ENDLER	048 26 9264	71-9		
MRS. GENEVA FENNELL	223 60 3098	71-9		
BEVERLY FILER	176 36 6846	71-9		
MRS. SHARON HEATH	523 58 1871	71-9	71-16	
MRS. JOANNE HUDSON	140 44 0039	71-9		
ROSALIND S. KEIR	167 38 2723	71-9		
MRS. RITA KLEPNER	157 34 4254	71-9		
MRS. LOUISE MATTHEWS	247 22 1888	71-9		
MRS. BONNIE MYERS	210 32 3918	71-9		READING SUPV.
THELMA NICHOLAS	222 22 5082	71-9		
MRS. SHARON PETR	220 50 3335	71-9		
MRS. ALICE REYNOLDS	221 24 9013	71-9		
FRED SEYFERT		71-9		
MRS. PAMELA SIMPSON	236 80 9254	71-9		
MRS. MARTHA SMITH	222 30 9465	71-9		
MICHAEL VISNOVSKY	200 05 5283	71-9	71-17	DIR. EDUC.
MRS. MARY WAGNER	079 03 9075	71-9		
MEL WARREN	240 30 1167	71-9		ELEMENTARY SUPV.
MRS. JULIA WATSON	304 28 3835	71-9		
HESS G. WILSON	182 16 2596	71-9	72-7	DIR. INSTR.

71-10 WILFRED MILLER, DIRECTOR N= 3

JAMES ANDREWS	C199 14 9475	71-2 71-10	
ONIL COUTURE	P016 30 9257	71-10	
WILFRED MILLER	173 07 1324	71-10	SCI. SUPV.

71-11 JANET JOHNSON, DIRECTOR N=24

MICHAEL G. BROUJOS	G221	16	0576	71-11	
MRS. PATSY CAPUTO	587	09	2978	71-11	
JOANNE DAVIS	222	28	2392	71-11	
MRS. CHRISTINE DRISCOLL	409	28	9615	71-11	
CARLOTTA HAMPSON	222	28	7024	71-11	
MRS. LINDA HENDERSON	143	40	0028	71-11	
MRS. JANET JOHNSON	125	03	4743	71-11	MIDDLE SCHOOL SUPV.
MRS. ELIZABETH KEARNS	183	22	6805	71-11	
RICHARD KUNTZ	191	38	7611	71-11	
MRS. KAREN KUNTZ	221	34	6325	71-11	
MRS. WENDY LUOMA	180	40	9329	71-11	
MRS. SHIRLEY MATHER	115	16	0845	71-11	
MRS. LOUISE MC GARA	025	24	1631	71-11	
MRS. MARION MUNYAN	206	16	9275	71-11	
ROBERT W. NEY	G192	20	7783	71-11	
MRS. RUTH NEY	187	38	5195	71-11	
PHILIP PYLE	171	34	7193	71-11	
LINDA QUILLIN	221	36	6803	71-11	
MRS. CAROLYN SOWDEN	221	28	3901	71-11	
MRS. LINDA SPOHN	170	38	7775	71-11	
MARY ANN TERANGO	232	58	5572	71-11	
MRS. MILDRED THOMAS	222	10	2519	71-11	
JOHN UNDERHILL	152	36	2837	71-11	
VERNA YOEMAN	222	24	4855	71-11	

71-12 JAMES DELANEY, DIRECTOR N=11

SISTER ALMA BINGWEAR	578 68 8825	71-12		INACTIVE
SISTER KYLLENE BODUM	051 18 3937	71-12		
SISTER CAROL CALLAHAN	579 66 9332	71-12		INACTIVE
SISTER ANNE JAMES CLARK	207 40 4365	71-12		
SISTER NANCY CROSSEN	168 22 3494	71-12		
ALFRED DI EMEDIO	221 28 3160	71-3	71-1272-7	
SISTER ISABEL FCHRATWIESER	129 16 8006	71-12		
SISTER BERNARD JOSEPH HOWE	178 30 5570	71-12		
SISTER MICHELINE MACEDONIO	174 42 3106	71-12		
SISTER MARIE MARTIN MAGUIRE	161 24 2095	71-12		
MRS. ELEANOR REITER	511 12 7282	71-12		INACTIVE

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 71-13 JOHN H. JENNY, DIRECTOR                                        N=12
MRS. SUZANNE M. BADY                 G521 56 443371-13            INACTIVE
IRVIN EBERHART                        182 36 605871-13
JON FORD                              194 30 906571-13
GERALD GAWRONSKI                      222 34 562771-1372-15
MRS. KAY HAUBOIS                      172 30 204771-13
JOHN H. JENNY                         153 07 616971-13         ASST. SUPT.
SAMUEL JULIAN                         222 10 667071-13
EDWARD J. KEDDA                      G189 18 997571-1372-10
RICHARD MULLIN                       G186 34 045171-13
VLADIMIR RADNOVIC           CARD 1   G222 34 169370-1 71-6 71-1371-18CONT.
VLADIMIR RADNOVIC           CARD 2   G222 34 169371-22            INACTIVE
K. JAMES SMITH                        222 18 586071-13
EDWARD STEPHENS                       215 26 411071-13           PRINCIPAL
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71-14 THOMAS S. HOUNSELL, DIRECTOR N=43

JANICE ARMSTRONG	222	26	1957	71-14	
CARRIE ATKINSON	222	22	5433	71-14	
JEAN BACINO	161	40	4344	71-14	
MRS. MARION BAIRD	217	28	6727	71-14	
LONOLA BALDWIN	236	58	4531	71-14	
MRS. DEBORAH CAMPBELL	351	36	1398	71-14	
MRS. CAROLYN CARROLL	221	30	2676	71-14	
MRS. SUSAN CENTRELLA	182	38	5484	71-14	
MRS. THERESA DEMPSEY	221	18	0158	71-14	
MARTHA J. DONOVAN	221	28	9742	71-14	
MRS. LOUISE DURANTE	206	14	0819	71-14	
NANCY EDWARDS	222	22	8564	71-14	
LYNNE ETTINGER	222	28	7296	71-14	
MRS. ANNE FENNO	222	28	6148	71-14	
MRS. JANE GLIDEWELL	337	24	4468	71-14	
CAROLYN GUY	222	16	7295	71-14	
MRS. PRUDENCE HALDAS	221	26	9871	71-14	
PETER HALLBERG	475	07	6599	71-14	
FRANCES HECK	221	32	7613	71-14	
HAROLD HENRY	201	16	1655	71-14	
THOMAS S. HOUNSELL	L205	34	2159	71-14	SPEC. PROJECTS
MRS. MARLENE JAMES	334	30	3828	71-14	
MRS. SALLY JEFFREY	222	26	2021	71-14	
MRS. DOROTHY JOHNSON	222	28	7213	71-14	
MRS. PATRICIA JOHNSTON	222	34	2105	71-14	
MRS. BARBARA KISCO	135	36	8055	71-14	
MRS. CHARLEAH LOUGH	012	41	4746	71-14	
MRS. DOROTHY MABREY	222	30	0884	71-14	
MRS. CAROLE MARSHALL	222	28	1728	71-14	
LIANE MC DOWELL	221	34	3630	71-14	
MARCELLA MEDGEBOW	222	28	6958	71-14	
MARIAM MINNER	221	28	7224	71-14	
MRS. BEVERLY OWEN	165	42	3908	71-14	
MRS. HILDA POINDEXTER	245	42	1379	71-14	
MRS. DELORES REEVES	295	38	0994	71-14	
MRS. ELIZABETH REID	261	30	6160	71-14	
DIANE ROBERTS	204	40	7620	71-14	
MRS. JUNE SCHMIDT	335	30	8836	71-14	
MRS. MAXINE WAEGEL	567	32	1552	71-14	
MRS. JOYCE WAMPLE	222	30	5704	71-14	
MRS. KATHLEEN WEIR	221	30	4224	71-14	
MRS. ADDIE WILSON	234	20	4777	71-14	
MRS. ANNE WIX	157	32	1587	71-14	

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 71-15 DR. YOLLES, DIRECTOR                                            N=2
MARIE BONNER                              C180 20 448271-15
MRS. MAIRA DE LA CUESTA                   G221 20 588871-1 71-8 71-15 ALSO MAT
GARY E. DUNKLEBERGER                      G184 38 603271-1 71-1571-25
RONALD ESHLEMAN                           C187 32 642171-1571-2572-14
MICHAEL P. GREEN                          P167 38 833971-1 71-1571-25
CAROLYN HAAS                              P175 40 317071-1 71-15
ELDON K. HAMRICK                          G233 64 528371-1 71-1571-25  ON LEAV
JOHN IGNATIEFF                            C152 34 533671-1 71-15
WILLIAM KEAY                               202 28 525871-1 71-15
MRS. JAN B. KIRK                          B261 82 698771-1571-25
FRANK S. LUXL                 CARD 1      C219-62-992971-1 71-2 71-1572-10CONT.
FRANK S. LUXL                 CARD 2      C219-62-992972-1772-24
JOSEPH R. MAXWELL, JR.                    C179 34 970771-1 71-15
MRS. VELTA NICKERSON                       221 22 737671-1 71-15          INACTIV
CYNTHIA NOLAN                              144-38-188471-1 71-1571-25
MARY FRANCES O CONNOR                     G235 62 310471-1 71-15
BRUCE PARSONS                             G240 62 423071-1571-25
DR. JOSEPH RYAN                            477 30 407871-1 71-1571-25
RAYMOND P. SANFORD                        C156 34 744871-1572-5
MRS. BETTY SCOTT                          C170 30 987171-1571-25
DR. MICHAEL STEMNISKI                     G184 32 291071-1 71-1571-2371-25
LOUIS J. TENTROMONO                       G178 36 083171-1571-25
PHILIP VAVALA                              222 32 948771-1571-2572-14
MRS. MARGARET W. WEBB         CARD 1      L157 34 329871-1 71-8 71-1571-23CONT.
MRS. MARGARET W. WEBB         CARD 2      L157 34 329871-25               INACTIV
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71-16 DR. BROWN, DIRECTOR			N=43
MRS. MILDRED ACKERMAN	221 26 4152	71-16	
MAUREEN ANSCAVAGE		71-16	
JOAN BONSALL	221 36 5899	71 16	
MRS. EVELYN BREWSTER	134 34 0685	71-16	
MRS. JANE CAMPBELL	222 12 2441	71-16	
MRS. RONA CRAIG	222 22 9863	71-16	
MRS. BARBARA DAVIS	211 38 9653	71-16	
MRS. DORIS DAVIS	203 26 4854	71-16	
JOSEPH DI SALVO, JR.	221 28 3334	71-16	
FREDERICK DUFFY	222 30 3701	71-16	
MRS. FLORYNE EIDELSON	212 48 5199	71-16	
CHARLES EISENBISE	186 22 6756	71-16	MATH SUPV.
MARJORIE FROEHLICH	198 30 8938	71-16	
MRS. JOAN GEHRKE	211 30 6702	71-16	
ROSEMARY HAMILTON	232 24 6507	71-16	
MRS. SHARON HEATH	523 58 1871	71-9 71-16	
MRS. KATHERINE HOWARD	255 44 7955	71-16	
MRS. BEVERLY KENDIG	221 28 3885	71-16	
MRS. SELMA KUTNER	103 20 4563	71-16	
LINDA LAWRIE	243 28 3812	71-16	
MRS. EVELYN MAURICETTE	064 14 7648	71-16	
MARGARET MC CLAIN		71-16	
JOHN MC DERMOTT	185 26 3350	71-2 71-16	
MRS. BEVERLY MC GUIRE	483 30 2706	71-16	
MRS. DOROTHY MC QUAID	221 28 9800	71-16	
COSETTE MORLEY	222 28 1176	71-16	
MRS. PATRICIA MUMMERT	186 28 5490	71-16	
MRS. BETSY NEJAKO	171 28 8282	71-16	
MRS. EVELYN NICHOLSON	222 20 1147	71-16	
SHIRLEY PHILLIPS	200 32 4554	71-1672-1	
RITA POMPONIO	198 34 2566	71-16	
PAUL ROBINSON	169 24 3390	71-16	
MRS. EVELYN RYAN	221 12 2815	71-16	
MRS. VERENA SHARKEY	232 58 0582	71-1672-15	
MRS. DORIS STEWART	188 26 0015	71-16	
MRS. MARY STEWART	221 30 1312	71-16	
SISTER CLAUDE TABLONSKI		71-16	
RONALD THOMAS	221 28 0654	71-16	
MRS. MARY WATKINS	203 05 3779	71-16	
MRS. MARY WEBER	182 20 9094	71-16	
YVONNE M. WELCH	221 36 8815	71-1671-1771-1972-16	
JAMES WILSON	172 34 1417	71-16	PRINCIPAL
KATHRYN WILSON		71-16	

71-17 JOHN REIHER AND WILLIAM GEPPERT, DIRECTORS N=30

MRS. JOANNE D. BENSINGER	221 26 0949	71-1771-1972-16	
MRS. MARY B. BENSON	149-30-9449	71-17	
MRS. MAE W. BETZ	221 12 9410	71-1771-1972-16	
MRS. OLIVA A. BOHENICK	188-26-1190	71-17	
GEORGE C. BROWN	212 12 9304	71-17	
MRS. LAURA C. BRUCE	213 22 6525	71-1771-19	
MRS. GEMMA L. BUCKLEY	221-36-3129	71-17	
MRS. RUTH H. CONNERTY	222-22-6795	71-17	
MRS. LELA J. COOK	024 20 2223	71-1771-1972-16	
NANCY DI BIASO	222-28-6938	71-1772-16	
MRS. FRANCES B. EASTBURN	222 24 2857	71-1771-1972-16	
MRS. HALLIE J. FISHER	G280 20 7829	71-1771-19	
MRS. SARAH B. GREGG	249 34 9579	71-1771-1972-16	
MRS. DEBORAH GRISE	221 36 0209	71-17	
MRS. ESTHER K. INSINGA	222 22 2861	71-1771-1972-16	
MRS. RUTH T. JACKSON	159-20-8097	71-17	
PAUL S. JULIAN	221-22-5587	71-17	
MRS. MURIEL T. MARSTON	222-28-2291	71-1772-16	
MRS. DIANE L. NARDO	222-30-6192	71-17	
EDWARD NORRIS	221 30 7791	71-17	
ARDIS B. RASMUS	222 20 0717	71-1771-19	
RUDOLF W. SAUER	171-20-2029	71-17	PRINCIPAL
FRED W. SAUNDERS, JR.	226 20 7707	71-1771-1972-16	
MRS. SYLVIA B. SEPPALA	246-52-2979	71-1772-16	
MRS. VIOLET B. STANLEY	235 62 0759	71-1771-1972-16	
MICHAEL VISNOVSKY	200 05 5283	71-9 71-17	DIR. EDUC.
MRS. JANET N. WELCH	220 26 0033	71-1771-19	
YVONNE M. WELCH	221 36 8815	71-1671-1771-1972-16	
MRS. JESSYCLER WHITE	527 64 6318	71-1771-19	
MRS. JEAN C. WILLIAMS	403-58-1013	71-17	

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 71-18 AL BURKHARDT, DIRECTOR                                                  N=49
JERRY ALCORN                                G268 42 0264|70-1 71-18
DENNIS BANKS                                G221 26 2667|70-1 71-6 71-1871-2272-1
RALPH BATTAGLINO                            G222 32 0010|70-1 71-6 71-1871-22
MELVIN BLECHMAN                             G221 22 3145|70-1 71-18
BELASCO BOSSARD                             G247 48 5080|70-1 71-6 71-18
MRS. JOYCE BUDNA                            G221 24 1630|70-1 71-18
GEORGE CACCAMISE                            G061 40 0952|70-1 71-18
HUNTER CLARK, JR.                           B194 16 0131|70-1 71-18
MRS. MARY J. COLLIER                        G223 36 2956|70-1 71-6 71-18
HOWARD CULVER                                222 26 3021|70-1 71-18
ATWOOD CURTIS                                004 38 5976|70-1 71-1872-1 72-8
JOHN T. DARDEN                              G222 28 8770|70-1 71-1872-13
MARK L. DAVIS                               G030 20 3668|70-1 71-1871-23
MRS. HARRIETT DONOFRIO                      G216 48 5976|70-1 71-3 71-18
MRS. LINDA DRUMM                            G171 40 6073|70-1 71-18
ROBERT E. DRUMM                             G173 36 6655|70-1 71-18
LEON GARDNER, JR.                            247 72 6531|70-1 71-1872-1 72-8
FRANK GIESKE                                G233 78 0526|70-1 71-6 71-18
GEORGE R. GLADING                           G221 20 7164|70-1 71-1872-1 72-8
MITCHELL B. GORDON, JR.      CARD 1         G233 66 1501|70-1 71-6 71-1871-23CONT.
MITCHELL B. GORDON, JR.      CARD 2         G233 66 1501|72-1 72-8
ALLEN HILL                                   221 12 3472|70-1 71-18
DEAN HINZMAN                                G227 42 4142|70-1 71-6 71-18
GEORGE HURLEY                               G214 30 9148|70-1 71-18         INACTIVE
LARRY IAMPIETRO                             G185 38 6090|70-1 71-1872-1
ALFRED JOHNSON                               221 14 2125|70-1 71-1872-1
ROBERT JOHNSON                              G190 18 7956|70-1 71-18
CHARLES JOSEPHSON                           G065 30 8275|70-1 71-6 71-18
ALEXANDER KANSAK                             221 16 1022|70-1 71-6 71-1871-22
RUSSELL KNAUB                               G164 28 6823|70-1 71-18
WALTER JOHN LAYTON, JR.      CARD 1         B221 28 1346|70-1 71-6 71-1871-22CONT.
WALTER JOHN LAYTON, JR.      CARD 2         B221 28 1346|71-2372-1 72-8
JAMES E. LONG                               L233 62 7196|70-1 71-6 71-1871-2272-8
ROBERT MILLER                               G201 24 4545|70-1 71-6 71-1871-22
THOMAS MILSPAW                              G221 28 9011|70-1 71-6 71-1871-2271-23
JOHN OSTERHOLM                              E222 30 7600|70-1 71-6 71-18
MRS. JEAN PEPPARD                            206 32 8319|70-1 71-1872-1 72-8
WILLIAM PHILLIPS                            G222 34 1776|70-1 71-18
MRS. VERNA PRICE                            L173 24 0461|70-1 71-6 71-1872-8
VLADIMIR RADNOVIC            CARD 1         G222 34 1693|70-1 71-6 71-1371-18CONT.
VLADIMIR RADNOVIC            CARD 2         G222 34 1693|71-22              INACTIVE
ANTHONY J. ROUSAK, III.                     G211-36-0482|70-1 71-1872-1 72-12
LAURENCE SIRMAN                             L222 30 8103|70-1 71-18
FRED SMITH                                  B164 28 3289|70-1 71-18
CHARLES R. STEIN                            G222 14 6490|70-1 71-6 71-1872-1 72-12
WILLIAM STEVENSON                            221 05 4321|70-1 71-1872-1 72-8
ROY WALL                                    G222 09 9819|70-1 71-18
BEN C. WETHINGTON                           G231 16 8341|70-1 71-1872-1
DELORIS WHITTLE                             G228 66 6582|70-1 71-18       PHYS. ED.
JUNE WILSON                                 G232 72 2338|70-1 71-18
CLARENCE ELLIOT WORKMAN                     G222 28 7605|70-1 71-6 71-1871-22
SAMUEL WYLIE                                 221 26 7381|70-1 71-18
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71-19 JOHN REIHER, DIRECTOR N=17

MRS. JOANNE D. BENSINGER	221 26 0949	71-1771-1972-16
MRS. MAE W. BETZ	221 12 9410	71-1771-1972-16
MRS. LAURA C. BRUCE	213 22 6525	71-1771-19
WINSTON CLELAND	P222 68 6745	71-1971-2172-1172-16
MRS. LELA J. COOK	024 20 2223	71-1771-1972-16
MRS. FRANCES B. EASTBURN	222 24 2857	71-1771-1972-16
MRS. HALLIE J. FISHER	G280 20 7829	71-1771-19
MRS. SARAH B. GREGG	249 34 9579	71-1771-1972-16
TIM HOLSCLAW	233 60 5199	71-1972-16
MRS. ESTHER K. INSINGA	222 22 2861	71-1771-1972-16
MRS. PATRICIA H. MC GONIGAL	183 22 5126	71-19
ARDIS B. RASMUS	222 20 0717	71-1771-19
FRED W. SAUNDERS, JR.	226 20 7707	71-1771-1972-16
MRS. VIOLET B. STANLEY	235 62 0759	71-1771-1972-16
MRS. JANET N. WELCH	220 26 0033	71-1771-19
YVONNE M. WELCH	221 36 8815	71-1671-1771-1972-16
MRS. JESSYCLER WHITE	527 64 6318	71-1771-19

71-20 DALE REYNARD, DIRECTOR

N= 1

DALE REYNARD C192 28 5441 71-20

71-21 WINSTON CLELAND, DIRECTOR N=1

WINSTON CLELAND P222 68 6745 71-1971-2172-1172-1

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 71-22 MAURA GEENS, DIRECTOR                                           N=19
DENNIS BANKS                          G221 26 266770-1 71-6 71-1871-2272-1
RALPH BATTAGLINO                      G222 32 001070-1 71-6 71-1871-22
MARY V. CLARK                         B232 76 122971-22           INACTIVE
ROBERT CRAIG                          G302 38 554571-7 71-22     PRINCIPAL
FRANCES ANNE CZAPLICKI                 222 34 9551         SEE MACIARELLO
WILLIAM L. DIXON                      G274 38 936171-6 71-22      RESIGNED
JOHN S. DRAGER                        B211 34 496671-6 71-22
MARILYN L. GOWER                                 71-22
WILLIAM R. HALL, JR.                  G198-34-380071-6 71-22
ALEXANDER KANSAK                       221 16 102270-1 71-6 71-1871-22
WALTER JOHN LAYTON, JR.     CARD 1    B221 28 134670-1 71-6 71-1871-22CONT.
WALTER JOHN LAYTON, JR.     CARD 2    B221 28 134671-2372-1 72-8
JAMES E. LONG                         L233 62 719670-1 71-6 71-1871-2272-8
MRS. FRANCES C. MACIARELLO             222 34 955171-6 71-22
JOHN MACIARELLO                        222 30 306471-6 71-7 71-22
ROBERT MILLER                         G201 24 454570-1 71-6 71-1871-22
THOMAS MILSPAW                        G221 28 901170-1 71-6 71-1871-2271-23
VLADIMIR RADNOVIC           CARD 1    G222 34 169370-1 71-6 71-1371-18CONT.
VLADIMIR RADNOVIC           CARD 2    G222 34 169371-22           INACTIVE
DAVID RAZANNO                          192 38 489671-7 71-22
CHARLES H. WEBB                       B222 26 323171-6 71-22
CLARENCE ELLIOT WORKMAN               G222 28 760570-1 71-6 71-1871-22
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 71-23 DR. UFFELMAN, DIRECTOR                                    N=13
GLORIA ALUISE                              222 34 370171-8 71-23
MARK L. DAVIS                             G030 20 366870-1 71-1871-23
MITCHELL B. GORDON, JR.     CARD 1        G233 66 150170-1 71-6 71-1871-23CONT.
MITCHELL B. GORDON, JR.     CARD 2        G233 66 150172-1 72-8
JOHN F. HOLLIS                            G221 28 111071-2372-13
FRANK G. HUTTON                           B296 40 184271-8 71-2372-7
MRS. SALLY KEHOE                           221 26 045671-8 71-23          INACTIVE
WALTER JOHN LAYTON, JR.     CARD 1        B221 28 134670-1 71-6 71-1871-22CONT.
WALTER JOHN LAYTON, JR.     CARD 2        B221 28 134671-2372-1 72-8
THOMAS MILSPAW                            G221 28 901170-1 71-6 71-1871-2271-23
EHRET PAGE                                G211 28 061971-23               INACTIVE
MRS. MARY S. PRATT                        G254 26 511571-8 71-23
MRS. VIRGINIA STAFFORD                     206 36 329171-8 71-23
DR. MICHAEL STEMNISKI                     G184 32 291071-1 71-1571-2371-25
MRS. MARGARET W. WEBB       CARD 1        L157 34 329871-1 71-8 71-1571-23CONT.
MRS. MARGARET W. WEBB       CARD 2        L157 34 329871-25               INACTIVE
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71-24 DR. RICKS, DIRECTOR		N= 9
LAWRENCE DRUMMOND	71-2472-25	
JOHN GREEN	71-2472-25	
CAROL HARMON	71-2472-25	
SHERILYN JOHNSON	71-2472-25	
MRS. SUSAN B. LAYTON	71-2472-25	
RONALD MATTHEWS	71-2472-25	
VICKIE MOCKBEE	71-2472-25	
MRS. ALICE NAUMAN	71-2472-25	
STEPHEN PENNYPACKER	71-2472-25	